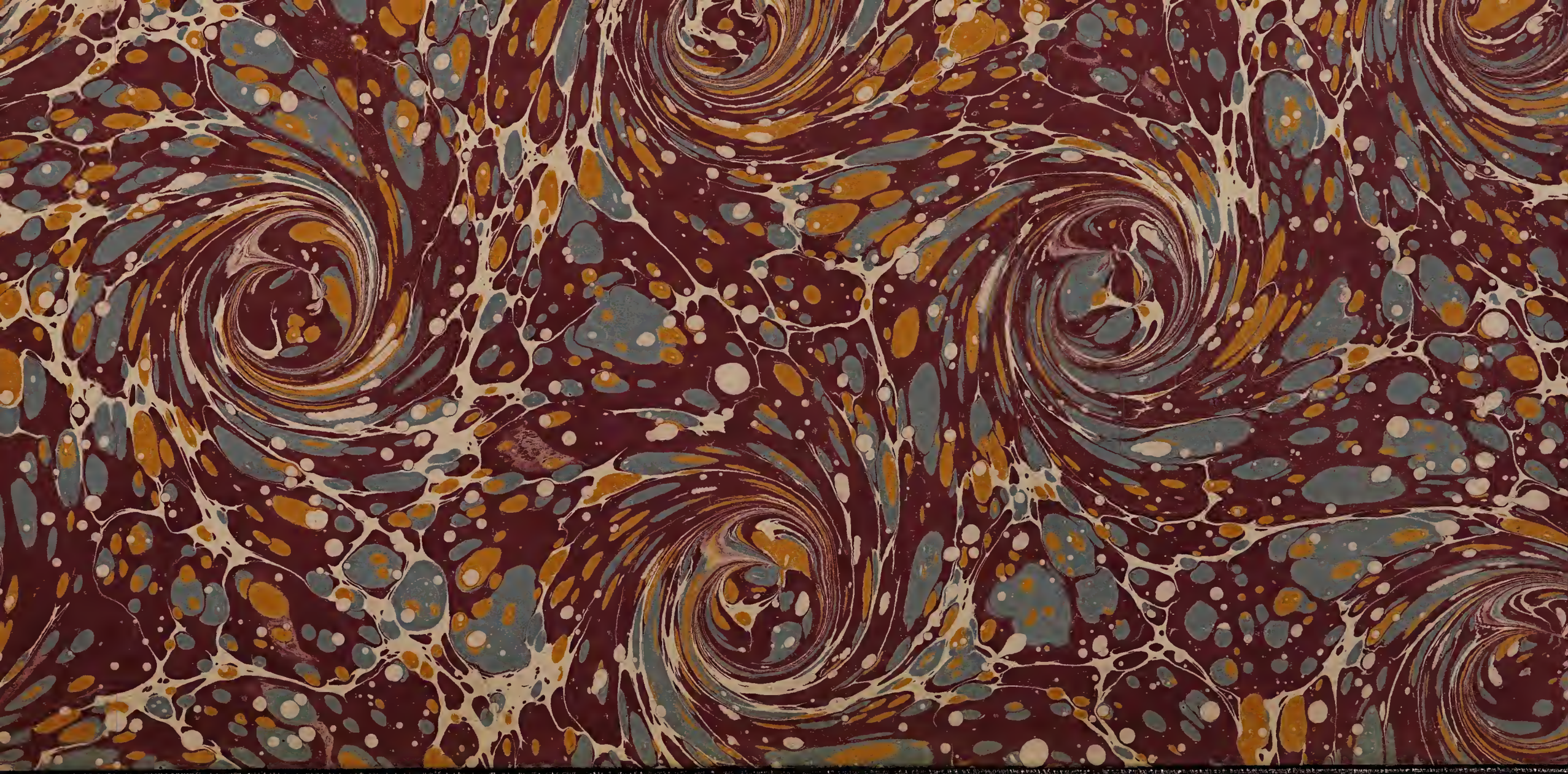

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THE

TRANSACTIONS

OF THE

PROVINCIAL

MEDICAL AND SURGICAL

ASSOCIATION.

INSTITUTED 1832.

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PROCEEDINGS

AT THE

TENTH ANNIVERSARY MEETING

OF THE

PROVINCIAL

MEDICAL AND SURGICAL ASSOCIATION,

HELD AT EXETER.

The tenth anniversary of the Association was held on Wednesday and Thursday, the 3rd and 4th of August, at the Athenæum, Exeter. Of those present on this occasion the following members inserted their names in the book placed at the Athenæum for that purpose :—

Charles Hastings, M.D., Worcester; Jonathan Toogood, Bridgwater; James Crang, Timsbury; T. Shapter, M.D., Exeter; Edward P. Pridham, Exeter; Thomas Martin, Reigate; Edward Barlow, M.D., Bath; Samuel Ludlow, Eastden, Starcross; Joseph Garside, Starcross; Francis Fox, M.D., Brislington House; John H. Fuge, Plymouth; John Tucker, Exeter; T. Cowper, Exeter; John Daniell, M.D., Bath; George Wallis, M.D., Bristol; Samuel Budd, M.D., Exeter; W. H. Crowfoot, Beccles; R. Hughes, Stafford;

John S. Soden, Bath; William Hey, jun., Leeds; T. L. Surrage, Clifton; William Mortimer, Clifton; Henry Shaw, Exeter; J. H. James, Exeter; Richard Lewin Pennell, M.D., Exeter; James Black, M.D., Manchester; Samuel Cowper Brown, Exeter; William Newnham, Farnham, Surrey; William J. Wickham, Winchester; P. Miller, M. D., Exeter; J. B. Estlin, Bristol; Thomas Cann, Seaton; Samuel Wreford, Ottery St. Mary; W. Travers Cox, M.D., Bath; Henry C. Boisragon, Cheltenham; R. H. Lucas, M.D., Exeter; Archibald Robertson, M. D., Northampton; W. Williams, Heavitree; R. Battersby, M. D., Torquay; Dr. Haward, Halesworth, Suffolk; Edward Yarde, Crediton; A. Atkins, Paignton; W. Land, Exeter; P. Hennis Green, M.D., London; George Owen, Dolton; George R. Trewman, Hatherleigh; John Butter, M.D., Plymouth; W. H. Besly, Exeter; T. C. Tothill, Topsham; J. Body, Cheriton Fitzpaine; J. G. Croker, M.D., Bovey Tracey; John T. Parker, Exeter; William Collyns, Kenton; J. H. May, Exeter; H. S. May, Tiverton; W. Kettle, M.D., Tiverton; William Empson, Clisthydon; Glass Black, M.D., Exmouth; W. Woodman, Exeter; R. F. Burrough, Dartmouth; Arthur Kempe, Exeter; G. P. Amory, Exeter; John Spettigue, Exmouth; R. C. Price, Lympstone; James Billet, Taunton; J. B. Bartlett, Teignmouth; William Gillard, Totnes; T. Hunter, Budleigh Salterton; Charles K. Webb, Exeter; Edward Oxley, M.D., Exeter; Robert Arscott, Exeter; John Edye, Exeter; J. C. Jerrard, Honiton; Thomas George Norris, Exeter; Samuel Devenish, Honiton; W. Caird, Exeter; Erasmus M. Miles, M.D., Heavitree; John Forbes, M.D., London; P. C. Delagarde, Exeter; J. F. Knighton, Dawlish; Arthur J. Cumming, Exeter; W. H. Elliot, M.D., Exeter; J. S. Perkins, Surgeon, Exeter; Frederick Mackenzie, Tiverton; John Winterskall, Surgeon to the Scotch Greys, stationed at Exeter; William Moore Cann, Dawlish; Allan Waters, Exmouth; John Tucker, Exeter; F. A. Cleeve, Bradninch; W. D. Kingdon, M.D., Exeter; Henry L. Cowen, Army Medical Staff; T. W. Coster, M.D., Castle Carey; John

William Harris, Exeter; T. L. Brown, Broadclyst; Thomas Hall, Woodbury; A. Barrett, Bath; Henry L. Hogg, Topsham; John Mogridge, Bovey Tracey; Norman King, Exeter; Edward Hulme, M.D., Exeter; T. Land, Exeter; H. W. Livett, Wells, Somerset; W. Budd, M.D., Bristol; Paul William Swaine, Devonport; W. H. Merry, Broadclyst; J. D. Jeffery, Sidmouth; Edwin Empson, Crediton; James Lyddon, Exeter; G. G. Bompass, M.D., Fishponds, near Bristol; George Vicary, Warminster; J. G. Crosse, Norwich; W. Briscoe, Kenton; Christian Budd, North Tawton; Samuel Barnes, Exeter; J. C. Davy, Chulmleigh; P. F. Haley, Witheridge; B. M. Browne, Chudleigh; J. Ormond, Bath; John Joce, Swymbridge, Barum; T. Berry Torr, Barnstaple; Thomas Turner, Manchester; G. Allen, St. George's; T. S. Marsden, M.D., Exeter; W. B. Carpenter, M.D., Bristol; William Trevor, Dulverton; H. W. Randolph, Milverton; G. Bottomley, Croydon; W. Anson Cartwright, Teignmouth; Henry Cartwright, M.D., Torquay; W. H. Cullen, Sidmouth; James F. Symes, Axminster; Charles Hallett, Axminster; B. Toogood, Torquay; J. Rich, Churchingford; William H. Evans, Bath; J. L. Nosworthy, Moreton Hampstead; T. Foster Barham, M.B., Exeter; John J. Feild, M.D., Torquay; — Queckett, Plymouth; T. Crosse, Thorverton; Henry Hawes Fox, M D., Bristol; G. Martin, M.D., Ventnor, Isle of Wight; H. Shaw, Exeter; William Kane, Exmouth; Matthew Kane, M.B, Madras Medical Service; T. S. Hodge, Sidmouth; C. E. Bernard, Weston-Super-Mare; W. C. Radley, Newton Abbott; T. Davy, Ottery; W. S. Tinney, Ottery; C. Hainworth, Crediton.

A council meeting was held at eleven o'clock on Wednesday morning, at the conclusion of which was held the first general meeting; when Dr. Boisragon, as the senior Vice-President of the Association then present, took the chair—the retiring President, Dr. Goldie, being unavoidably absent. The chair was then resigned to J. H. James, Esq., of Exeter, the President for the year ensuing.

Mr. James addressed the members,* and then called on Dr. Hastings, who read the report of the council;† when it was moved by Dr. Miller, of Exeter, and seconded by Mr. Barnes, of Exeter—"That the report of the council, now read, be adopted and printed."

Mr. Soden gave the following notice of motion for the next year:—"That the names of the members whose subscriptions are two years in arrear be printed as a separate supplementary list."

Dr. Hastings read a letter from Dr. Branson, of Sheffield, putting it to the consideration of the members whether a publishing society could not be formed upon a similar principle to one now supported by the clergy.

Moved by Dr. Barlow, and seconded by Dr. Wallis, of Bristol—"That this meeting offer their thanks to Dr. Branson for his suggestion relative to a medical publishing society, and the members would be happy to find that such a society could be supported by the profession."

Moved by Dr. Robertson, and seconded by Dr. Forbes—"That the thanks of the meeting be given to Dr. Goldie, the retiring President, and that he be appointed a Vice-President of the Association."

Moved by Mr. Soden, and seconded by Mr. Toogood—"That the thanks of the meeting be given to the Secretaries of the Association, Dr. Hastings and Mr. Sheppard."

Mr. Soden then gave the following notice of motion for next year:—"At the next annual meeting I intend to propose that the law limiting the number of secretaries to two be altered; that the word *two* be omitted, and that the number of secretaries may be unlimited."

Moved by Dr. Hennis Green, of London, and seconded by Mr. Crang, of Timsbury—"That the thanks of the meeting be given to the Council for the past year, and that they be requested to continue their services with the following additional members, and that they may be em-

* *Vide Provincial Medical Journal*, August 20, 1842, p. 383.

† *Vide Provincial Medical Journal*, August 20, 1842, p. 386.

powered to add to their number:—Patrick Miller, M.D., Exeter; Thomas Davies, M.D., Chester; R. Martland, M.D., Blackburn; E. G. Bruncker, M.D., Dundalk; T. W. Coster, M.D., Castle Carey, R. D. Thorpe, M.D., Leeds; R. S. Hopper, M.D., Leeds; Samuel Smith, Esq., Leeds; J. P. Garlick, Esq., Leeds; William Hey, jun., Esq., Leeds; W. F. Yonge, M.D., Coblenz; William Collyns, Esq., Kenton; Richard Lewin Pennell, M.D., Exeter; John H. Fuge, Esq., Plymouth; Edward Pridham, Esq., Exeter; Thomas S. Hodge, Esq., Sidmouth; R. Pullen, Esq., Hunslet, near Leeds; Charles Chadwick, M.D., Leeds; William Price, Esq., Leeds; W. Braithwaite, Esq., Leeds; Thomas Nunneley, Esq., Leeds; G. Taylor, M.D., Maidstone; —— Sibbald, M.D., Maidstone; Thomas Hitchings, Esq., Maidstone; Thomas Hunter, Esq., Budleigh Salterton; William Trevor, Esq., Dulverton; W. Haynes Maunder, Esq., Cullompton; William Gillard, Esq., Totness; Samuel Barnes, Esq., Exeter; Alfred Hardwick, M.D., Kensington; C. M. Durrant, M.D., Ipswich; C. K. Bree, Esq., Stowmarket; S. Burman, Esq., Wisbeach; Thomas Cammack, M.D., Spalding."

Dr. Barlow then read the report of the Reform Committee;* when Mr. Crosse, of Norwich, moved, and Mr. Martin, of Reigate, seconded—"That the report be received and printed; that the thanks of this meeting be given to them for the trouble they have taken in preparing it, and that the committee be re-appointed, and that the general council be especially enjoined to watch vigilantly, during the ensuing year, over all proceedings in Parliament and elsewhere, which have any relation to the subject of medical reform, and that they be empowered to employ every means which their judgment may direct for upholding the principles of reform, which the Association has so long and so steadily advocated, these principles being clearly and unequivocally declared in the several reports heretofore presented to the Association by their reform committees, and explicitly spe-

* *Vide Provincial Medical Journal*, August 20, 1842, p. 391.

cified in the memorial lately submitted to the Right Hon. the Secretary of State for the Home Department by the general council."

On the motion of Dr. Forbes, seconded by Mr. Crosse, the following were admitted as honorary corresponding members of the Association:—"Adolph Carl Peter Callisen, Doctor of Medicine and Surgery, Librarian to the Royal Chirurgical Academy of Copenhagen, Copenhagen; Alf. A. L. M. Velpeau, M. D., Surgeon to La Charitè, Professor of Clinical Surgery to the Faculty of Medicine of Paris, Paris; Wilhem Vrolik, M. D., Professor of Anatomy in the Athenæum of Amsterdam, Member of the First Class of the Royal Institute of the Netherlands, Amsterdam; Karl Fried. Heinrich Marx, M.D., Professor of Medicine in the University of Göttingen, Göttingen; Karl Rokitansky, M.D., Professor of Pathological Anatomy in the University of Vienna, Vienna; François Lallemand, M.D., Professor of Clinical Surgery in the University of Montpelier, Montpelier; Carl Von Seidlitz, M.D., Professor of Clinical Medicine in the Imperial Medico-Chirurgical Academy of St. Petersburgh, St. Petersburgh; Magnus Christian Retzius, M.D., Physician to the King of Sweden, Professor of Chemistry in the Royal Military Academy of Stockholm, Stockholm; Philip Francis Von Walther, Doctor of Medicine and Surgery, Professor of Surgery in the University of Munich, Munich; Vincenzo Lanza, M.D., Professor of Practical Medicine in the Royal University of Naples, Naples.

The second general meeting of the Society was held on the same evening at eight o'clock, when there was again a full meeting of the members.

In consequence of Mr. Sands Cox being subpœned in a case of infanticide at Warwick, the address in surgery was not delivered.

Moved by Mr. Pridham, and seconded by Mr. Besley, of Exeter—"That Dr. Shapter, of Exeter, be requested to

deliver the retrospective address in medicine at the anniversary meeting for 1843."

Moved by Mr. Wickham, and seconded by Mr. Mortimer, of Clifton—"That William Hey, jun., Esq., of Leeds, be requested to deliver the retrospective address in surgery at the anniversary meeting for 1843."

Dr. Hastings produced a letter from Mr. Guthrie, late President of the College of Surgeons, on the subject of poor law medical relief; but, as it had appeared in all the medical periodicals very lately, it was not considered necessary to read it.

Dr. Black then read a communication from a medical officer of the Leigh Union, Lancashire, relating to the inadequate remuneration of medical officers in unions.

Moved by Mr. Pridham, of Exeter, seconded by Mr. Hunter, of Budleigh Salterton—"That the thanks of the meeting are due, and that they be given, to the poor-law committee, for the zeal and energy manifested by them on the subject of poor-law medical relief."

The third general meeting was held on Thursday morning, at twelve o'clock.

Dr. Barlow read the report of the Benevolent Fund.*

Moved by Mr. Newnham, and seconded by Mr. Fuge, of Plymouth—"That the report of the benevolent committee be received and adopted, and that the thanks of this meeting be given to them for the exertions they have made to increase the funds of this important branch of the Association."

Dr. Black, of Manchester, then read the retrospective address in medicine.

Moved by Mr. Turner, of Manchester, and seconded by Mr. Crowfoot, of Beccles—"That the thanks of the meeting be given to Dr. Black for his excellent address, and that he be requested to print it in the 'Transactions.'"

A variety of cases were read, and a few were left unread, for want of time.

* *Vide Provincial Medical Journal*, August 20, 1842, p. 394.

Moved by Dr. Henry Fox, of Bristol, and seconded by Dr. Daniel, of Bath—"That this Association is indebted to those gentlemen who have read cases and presented communications at this meeting, for which the thanks of the members are hereby tendered to them."

Moved by Mr. Trevor, of Dulverton, and seconded by Dr. W. Budd—"That the thanks of this meeting are eminently due, and that they be hereby tendered to Drs. Green and Streeten, for the liberal arrangements made by them for the weekly supply of the *Provincial Medical Journal* to the members of the Association."

Moved by Dr. Black, and seconded by Mr. Bottomley, of Croydon—"That the anniversary meeting for the year 1843 take place at Leeds, and that W. Hey, Esq., sen., be appointed President-elect."

Moved by Dr. Robertson, of Northampton, and seconded by Mr. Estlin—"That the thanks of this meeting be given to the different public bodies in Exeter who have so handsomely assisted its objects by the facilities they have afforded the Association at this anniversary meeting."

Moved by Dr. Boisragon, and seconded by Dr. Barlow—"That the thanks of this meeting be given to the learned and worthy President, for his unwearied attention to the members, and for his zealous exertions to promote the prosperity of the Association."

PART I.

ARTICLE I.

THE RETROSPECTIVE ADDRESS

DELIVERED AT THE

TENTH ANNIVERSARY MEETING

OF THE

PROVINCIAL

MEDICAL AND SURGICAL ASSOCIATION,

HELD AT EXETER, AUGUST 3rd and 4th, 1842.

BY JAMES BLACK, M.D.,

Member of the Royal College of Physicians, London; Physician to the Manchester Union Hospital; Lecturer on Forensic Medicine, Manchester Royal School of Medicine and Surgery.

If I had duly considered the high honour and responsibility which were awarded to me by the Provincial Medical and Surgical Association, at their meeting at York, of delivering an address on the progress and state of medicine during the current year, I should, perhaps, have declined the flattering undertaking—as much from a consciousness of my own inability to fulfil the distinguished trust in a manner satisfactory to myself, as from

a sense of what is eminently due to the scientific and highly professional character of this widely extended Association. The desire, nevertheless, of discharging, in any degree however inadequate, my share of the obligations, which I owe, in common as a fellow member, to the Association, for the benefits which it has conferred on the profession at large, and the encouragement, which it has given to medical science and pursuits, then emboldened me, though I now fear, with a rash hand, to accept an honour and a task which, under a more sober view of myself, I should have relinquished. When I also take into consideration the several justly distinguished and elaborate addresses that have been delivered before this Association by my talented predecessors in this office—addresses comprehending whatever was established as valuable, or considered as interesting or new in the state of medicine at the several periods of their delivery, I fear that I shall only be able to show, as if the rich harvest is passed, and the labours of their successor will be but as gleanings in the field. Encouraged, however, by the deference which this Association has shown toward me, in delegating me to the office of addressing you at this anniversary, and relying on your indulgence for whatever of stale or unimportant I may in ignorance or in poverty bring under your notice, or for whatever may be defective in the manner of its exposition, I shall proceed to what I have thought worthy of your retrospection. Moreover, I need scarcely say, that our review will be necessarily directed to what of importance, utility, and novelty, has occurred in medicine since this

Association was addressed by my talented and industrious predecessor, who, I find had, almost to the day on which we had the pleasure of hearing him at York, swept the whole horizon of the science, and left scarcely an object, worthy of the attention of that meeting, unobserved.

Before, however, we proceed to notice the specialities of the year, we shall shortly glance at the general character of medicine, as to its present attitude, form, and pressure.

That the science of medicine is one of continued movement, if not always of progressive improvement, is very evident from the pages of its history, at least from the revival of learning in Europe down to the present time. It must, however, be remarked, that owing to its inexactness and the want of demonstrative evidence in many parts and stages of its study, it has not proceeded with that steady and irrefragable course, which has characterized and built up some of the more exact departments of human knowledge, such as astronomy and some of the other dynamical sciences. In most of these, every step in advance is found to be secure, and forms either the fulcrum or basis, from which renewed progress may be validly attempted, or on which a structure may be reared, on whose endurance we may with confidence repose. But the march of medicine is not of so accumulative and invigorating a character; it rather seems to revolve in cycles, intersecting at times the outskirts of paths formerly traversed—yet, upon the whole, gradually emerging into the clearer light of the noonday of advanced intellect and discovery.

Much of this impulsive and intermittent character

of medical science is owing to the enthusiasm, which is natural to many minds, and impels them to break through the rigid fetters of patient observation and experimental proof; while in the eagerness to lay hold of the faint image of a final cause, the legitimate and often laborious process of philosophical deduction is either despised or overlooked. The investigations of physiology and pathology, from their approaching so near to the confines of psychology and metaphysics, naturally lead the ardent mind to leap the boundary between them, even where the line of demarcation is fairly marked out; while it not unfrequently happens, that the mind is unconscious of the trespass that has been committed, till it is carried, without reckoning or compass, down some bewildering current in this new and mysterious region.

Of all the departments in the science of medicine, that of the study of anatomy would seem to be the most demonstrative and defined, while any possible progress it might ever obtain would be conceived to be always bounded by a line of physical proof, to be seen and read by all followers of the science; yet of late we have observed the "Metaphysics of Anatomy" spoken of, especially among some German writers. This is, perhaps, less to be wondered at, when we consider the ultimate regions in the sphere of vision, and the extreme tenuity of the objects on which this important science has been lately exercised. The chace for discovery and the research after scientific truths are now taken out of the reach and investigation of the common observer; and though the

maxim of *de minimis non curat lex* still holds good in the sister profession, yet in ours the molecules of organized matter, even to the $\frac{1}{40,000}$ part of an inch, as in the chyle, are become the field of the anatomical researches of the present day, and where many interesting and important discoveries have been made. It is not difficult, therefore, to imagine, that, in dealing with objects of such extreme minuteness, or even with those of much increased diameter, the transition from the visible *concrete* to the mental *abstract* may be as captivating as it is easy; while this privileged introduction to the *penetralia* of nature may be so flattering to the investigator, as to induce him, in gratitude, to give a somewhat undigested account of what he has so specially enjoyed.

Owing to the captivating and, at times, the exclusive nature of these pursuits, many trustworthy discoverers have of late become so ardent in this infinitessimal field of anatomy, and so much emulation has been shown in their explorations, that they have occasionally come into collision, and jostled each other on almost the narrow limits of a needle's point, as has been witnessed in some late investigations into the tubular structure of the teeth, and the nature of cancer. The research after cytoblasts, nuclei, nucleoli, and corpuscles of the lymph, fibrine, blood, and pus, has also brought many rival discoverers into the field, who, though not agreeing in all their observations, and often differing about the prior claim to the game that has been started, have, nevertheless, all greatly enriched the republic of science with many new and interesting facts and observations. The hottest pursuit has lately been in the

direction of the kidneys—into the intimate structure of which there has been much independent investigation, with something of a little laudable jealousy and desire of anticipation on the part of those engaged. The special object of research was the Malpighian bodies, in their normal, but especially in their morbid structures—the investigation of the last of these conditions it being thought would give more insight into that species of degeneration called Bright's disease; and, I think, these objects have been greatly promoted, if not yet fully attained, from some brilliant discoveries that have been made during the last year.

In recurring to the subject of *metaphysical* anatomy, we may also mention the indefinite yet tempting nature of investigations into several parts of the nervous system. Correct, valuable, and beautiful, as many of these late researches and facts are—pointing out in descriptive anatomy what Galen only asserted did exist as to the motor and sensory nerves throughout the body, and fairly as they have served to explain many phenomena in physiology and pathology, still other anatomical theorems of this class approach too nearly the boundaries of mere logics and metaphysics to entitle them yet to be ranked among the facts of medical science. I need but at present allude to the yet undemonstrated anatomical system, in man, of special nerves of the spine, limited to an excito-motory function; while many of the associated phenomena still continue to be interpreted by the extended and widely connected distribution of the great sympathetic or organic nerves. Negative evidence of no small

amount is also afforded by those full-grown fœtuses called anencephalous, which also want the spinal cord, but which are otherwise fully developed and live for a while, even to some days, after birth. In the endeavour, also, of some respectable writers to limit the irritability of the muscular and some other animal tissues solely to the presence and agency of the nervous system of either the white or the grey fibres, in opposition to the Hallerian doctrine, their anatomical zeal has led them to the alleged discovery of nervous granules or corpuscles being distributed universally throughout all the animal textures, which granules of themselves have an inherent nervous power and function, and become systematized and co-ordinated when arranged into the nervous cords.* It needs scarcely be said, that it is easier to imagine such a corpuscular structure of nervous matter than to observe it, especially as Schwann, Valentin, Gerber, Wagner, and Dr. Barry, do not recognise such a special corpuscularity, but rather a universal organization of cells or cytoblasts, of apparently the same identical form and structure, and from which all the organized and palpable parts and tissues of the body are gradually developed.

The debateable ground that has existed, from the days of Epicurus, on the profound subject of life and organization is still kept open, and on which a little metaphysical warfare is, from time to time, renewed, with little satisfaction or triumph to those who stir up the combat. The nature and settlement of this question are of less consequence to the

* *Vide Dr. Copeland's Dictionary,* Art. Irritability.

furtherance and utility of medical science, than they are to its character and moral bearings in the province of intellect. It would ill become me on this occasion to set the various arguments of what is considered even new in array before you; but I may be permitted to remark, that, irrespective of all *à priori* argument and revealed information, the evolution and growth of the germ have not been satisfactorily explained, if they ever can be, on the theory that organization is life—resulting from the aggregation of molecules primarily endowed with any possible chemical or electro-polar properties. Microscopic anatomy, though pursued with such recent success, has, moreover, in my humble opinion, afforded no aid to the physiological theory of life; for the minutest cells or cytoblasts have been observed to be of identical form and structure, and yet they are indiscriminately applied to the formation and growth of the severally different fluids and solid structures of the animal body. To constitute the several animal textures from the inherent automatic powers or properties of the ultimate molecules, it appears necessary that classes of them should be of different forms and structure, if not of different chemical and electrical constitutions, in order that they may be fitted to build up the several special organisms of the body. To provide theoretically for this specific development, the ancients, and especially Lucretius, held the ultimate atoms, that enter into the living organization, to be of diverse seeds and of different forms, each having a peculiar *secreta facultas*; but this convenient arrangement is scarcely in the power of modern physiologists to

make. The homogeneous character of the cytoblastema, or the apparent identity of the formative cells, in connection with the different tissues developed from them, appears to be less reconcileable with what is called the physiological doctrine than with that which acknowledges an implanted power of vitality, which moulds and appropriates the universal pabulum of cells or cytoblasts, according as it is specially delegated by the Source of all life and motion. This principle is termed the vital force by Liebig, who infers it is independent of the matter or form in which vital activity is manifested. According to him, it is the cause of growth, and of motion and change in the form and structure of material substances—attracting at one time, resisting at another, and again overcoming the chemical forces of cohesion and affinity in the constituents of food, and compelling them to assume new forms and arrangements.*

While we, however, join with many in the unsatisfactory nature of the proofs, or rather the reasonings of the advocates of the physiological doctrine of life, as resulting from, or necessarily dependent on, organization, it seems there is some difficulty in halting with others on the steps of animal vitality, as the source and *genesis* of mental phenomena; as we cannot easily comprehend how "the manifestations of vital endowment by means of a perfect nervous system, are the properties, powers, and faculties of the mind," or how "the powers of the mind are the highest properties and manifestations of life," as laid down by the talented

* *Liebig's Organic Chemistry of Physiology and Pathology*, 1842, p. 204.

and industrious author of the *Dictionary of Practical Medicine*. Neither can we, with a recent celebrated author, leave the question open or in doubt, whether the *psyche* has or has not an existence independent of that of the material organism.* We are much more inclined to consider it, with Liebig, "an immaterial agent entirely distinct from the vital force, with which it has nothing in common."†

What has tended, in some degree, to lower the tone and influence of what is called *vitalism* in medical doctrine, is the great attention that has lately been paid to the physical and chemical nature of the animal fluids. Researches into their conditions in health and disease have been attended with some valuable and practical indications, as throwing light upon the processes of digestion, assimilation, *urogenesis*, and morbid deposits. But, here again, a too exclusive attention to the fluids has sometimes made the living solid to be overlooked or undervalued in its vital relations, and the *primum mobile* of disease or derangement has the likelihood of being too much limited to the fluid conveyed, and not to the tube conveying; for the vital lesion cannot exist, for any appreciable time, in the one independent of the other, and more frequently it is the effect of one general lesion affecting both. After all, the tendency of medical doctrine is to revive a humoral pathology, but of a more enlightened character than was current in the days of Paracelsus. It is now based upon either the microscopic or chemical examination of the fluids, and its

* *Principles of Human Physiology*, by Dr. Carpenter, 1842, p. 80.

† *Liebig, ut supra*, p. 5

phraseology is becoming more observable in medical writings, especially in those relating to all kinds of contagious and epidemic fevers—to diseases depending on the several diatheses, and to urinary complaints, or the alterations in the urine during disease in other parts of the body. The writings of Berzelius and Liebig on organic chemistry have also served to make chemical pathology more esteemed and acceptable to the medical humourist. The latter chemist has shown how a little leaven may leaven the whole lump, by a few globules of pus or contagious matter, infecting the whole animal fluids, on his principle of *eremacausis*, and assimilating the whole globules of the blood to its own nature, after the manner of the yeast fermentation. He has also shown how a little poison is sufficient to arrest the vital motions, by one equivalent of arsenic or corrosive sublimate having the power to combine with and neutralize a comparatively large equivalent of fibrine. These modes of solving morbid phenomena or death give a sort of dignity and a scientific character to our resuscitated humoral pathology, notwithstanding the caution and jealousy, with which they may be viewed by the conservatives of solidism and its prime mover—the vital principle. The above and other new chemical views of Liebig on the animal organization and economy will, no doubt, have a great influence on physiological deductions, if not on the treatment of diseases. They make all vital activity to arise from the mutual action of the oxygen of the air and the elements of food; and, he says, that every thought, every sensation, is accompanied by a change in the

composition of the brain. In fine, every phenomenon of life, digestion, nutrition, excretion, secretion, respiration, and heat, depends on chemical action; and that the animal body is to be viewed, chiefly, as a complicated, yet intimately related, apparatus for the combustion of carbon and the elimination of its products with that of water.*

On whichever side we turn in the current progress of our science, we find an ardent labour and inquiry after fresh truths and novelties. Scientific investigation and study, as I have noticed, have forsaken the exhausted domain of visible and tangible anatomy, and the scalpel and probe have been thrown aside for the lens and the needle. The animal fluids are not now simply weighed and measured, with a report of their gross physical characters, but they are chemically analyzed and submitted to the microscope; and there seems at times a greater desire to know *atomically* the state of a patient's frame, than to cure him of his disease. This ardour and scientific pursuit have, notwithstanding, greatly advanced the study of, and added many important and interesting facts to, medical knowledge. I need but simply advert to the progress lately made in the study of the nervous system, and of pulmonary diseases—the circulation and composition of the blood in health and in several disorders—the process of digestion—the structure of the liver and kidneys, both normally and under the various changes which they undergo, in relation to their secretions—the evolution of the ovum and the development of the vessels and nerves of the uterus.

* *Liebig, op. cit. passim.*

In all these highly important parts and functions several new facts have been established, and discoveries made, in addition to what my talented predecessor has so amply detailed in his address of last year; and, with your indulgence, we shall endeavour to bring under review what of them are most remarkable in a scientific, or worthy of notice in a practical point of view.

Brilliant and rich as have, however, been many of these acquisitions in anatomy, physiology, and pathology, it yet seems, after all, that we are permitted to gather more from the tree of knowledge than from the tree of life; for it is acknowledged that the art of therapeutics does not advance, *pari passu,* with our attainments in the purely scientific parts of our profession. The art of healing should ever continue to be the practical end and bearing of all our studies, however exalted and successful may be our acquisitions in the domains of science. It not, however, unfrequently happens, that when we leave this proud and ennobling position, armed with the panoply of science, we begin to feel something like humiliation and disappointment, when we cannot dispel disease as easily or as surely, as we think we understand its seat and nature. We are, also, liable to forget that experience and, perhaps, an irksome application of rational experiment are moreover necessary to ensure anything like success or satisfaction. The being arrested at the practical barrier of therapeutics often frets and irritates the young and enthusiastic follower of medicine; he is not contented to know the secrets, and patiently to interpret the wants, of

nature—he is also eager to control or coerce her actions and aberrations. Hence he becomes tired or disappointed on the application of his scientific principles, which he preferably adheres to, and, perhaps, exclusively pursues the study of, during the rest of his life; or he takes up the rod of empiricism, and instead of waiting like a true devotee at the shrine of Apollo, he rudely and recklessly makes an assault on the very gates of the temple, where the god of the *ars divinior* dwells. Hence we see, not only in the hands of these over zealous sons of science, but also of those who never spent a drop of midnight oil in its pursuits, the bold attempts for evoking the demon of disease, by excruciating cauterizations and drastic medicines—the excision of half the tongue for to give the sufferer speech, and, if the spirit of mysticism, rendered more vivid by the *auri sacra fames*, has infected the practiser, we see the infinitessimal molecules of disease attempted to be ferretted out by the sinuous hand of homœopathy, or the painful disorders of the body exorcised by the magic pass of Mesmerism. Still, however short, it may be alleged, the therapeia has come, in comparison with the more advanced progress which anatomy and pathology have made, and however much it may popularly be held an opprobium to the profession, that, with so much boasted attainment of scientific knowledge, disease still prevails and proceeds with an almost undiminished career, we have no hesitation in claiming for ourselves, at this age, a more correct acquaintance with the physiological action of medicines, the conditions under which they may be better admi-

nistered, and with the necessity or propriety, in a great many cases, of exhibiting them at all, besides the discovery and most beneficial application of many new articles of the Materia Medica. Doubtless there is much in the practice of medicine to make us regret the insufficiency of our means to arrest or control disease, in comparison with the knowledge, which we justly claim to possess of all the gross and microscopic anatomy of the body and its morbid changes; but there is much also to encourage our hands and to invigorate our zeal: for if Celsus could say, in his day, "*Sed est tamen medicinæ fides, quæ multo sæpius, perque multò plures ægros prodest,*" surely the accumulated light of modern science and of historical experience must render the living profession a greatly augmented benefit to suffering humanity, and entitle its members to rank still higher among the most useful classes of mankind.

In taking a short retrospection of what we consider worthy of your notice on this occasion, in the special objects and departments of our profession during the by-past year, we might have attempted to address you on the state and progress of medicine, as it separately exists in the several great geographical divisions of Europe and America; but as the science and art of our profession constitute something like a general republic, independent of natural or artificial boundaries, it is more appropriate and useful that we should adhere to the scientific order of review so generally adopted, and approved of, on these occasions.

ANATOMY AND PHYSIOLOGY.

Descriptive or topographical anatomy has been hitherto so completely cultivated, and the whole field of structure and adaptation has been so far ransacked by the naked eye and the scalpel, that a new discovery is as rare, as its merits to originality are liable to be contested. It is in the more recondite and ulterior province of microscopic anatomy that we now find much to interest us, and bear the claim to novelty, if not to importance, in the science. To the microscope we are indebted for a knowledge of the real anatomy of the skin, its various papillæ, sudorific glands and their ducts, the muciparous and glandular apparatus, and the real structure of bone, the teeth, cartilage, tendon, muscle, cellular tissue, and, in fact, for all that may be called the physiological anatomy of the animal body. In this department we have to notice the great diligence and tedious research lately paid to the working out of the structure and development of the blood, the lymph, and other organic globules constituting the several fluids and soft textures of the body. We cannot, however, but allude to the want of that uniformity in the reports, made by the several observers, on the same important objects of their researches, which is so very desirable in all matters concerning structure, if not also function, to stamp the results of such investigations as undoubted facts in natural science. Thus, though all late observers nearly agree in describing the blood-corpuscles in man as having a flat or disc-like form—sometimes affecting the shape

of oblate spheroids, or having a bi-concave, or a bi-convex outline, with a central depression, and having their larger diameter from $\frac{1}{300}$ to $\frac{1}{400}$ of a line, still there exists much difference in their reports, as to the corpuscles containing *nuclei* or not. Dr. M. Barry, in his papers, published during the last year in the *Transactions of the Royal Society* describes as well as beautifully depicts the *nuclei*, which are developed, according to him, into several discs. He says, (p. 202)—"The nucleus, as usually thought a single object, consists of two or three, or even of many parts, having a constant and determinate form: the substance round the nucleus is the red colouring matter." Again, "the nucleus has a cavity or depression, which seems to represent one of the states of the *nucleolus* of some authors;" and he supposes these alleged *nucleoli* to be merely the division of the *nucleus* into discs, which, he says, are shed or evolved to become organized into fresh blood-corpuscles. Müller supports Hewson in the existence of the *nuclei;* and Gerber, in his elaborate work, says, the globules, like all cytoblasts, enclose in their middle a *nucleus* of the same general form and having a lenticular shape;* while Remak, of Berlin, remarked in the blood of chicks two *nuclei* in the elongated globules of their blood. In opposition to these observers, Dr. Young and, of late, Mr. Quekett† have denied the existence of *nuclei* in the globules of human blood. We have also Mr. Gulliver declaring that, though in the lower ver-

* *Gerber's Microscopic Anatomy*, translated by Mr. Gulliver, 1842, p. 64.

† *Microscopic Journal*, No. 5.

tebrate animals nothing is more distinct, it is otherwise in the mammalia; and I am quite convinced, he says, that the red particles of mammiferous animals have no *nuclei*, and that the globules in the camelidæ exhibit no *nuclei*.* But the principal doubtful evidence is from Wagner, who has entered into these and similar researches with an admirable skill and patience, as are exhibited in his *Lehrbuch der Physiologie*, and in his splendid plates. He says (s. 92)—"It is difficult to pronounce whether these constituents, viz. the *nuclei*, exist in the living blood; at any rate we but seldom see anything like a nucleus appearing in the capillaries of diaphanous parts. In man and in the mammalia we sometimes happen to bring a small kernel into the middle of the field of vision, but never regularly, often not at all—so that a *nucleus* still remains a matter of doubt."

Professor Owen has not observed any *nuclei* in the blood of the mammalia, but often in that of the lower animals, as the Batrachians. Henle has found *nuclei* in a few of the small corpuscles of mammalia; but in the majority, and these the larger, there are none.†

M. Donné, in his memoir read before the Academy of Sciences of Paris, in March last, says—"The circular red globules in the mammalia do not contain any nucleus, while the elliptical ones in reptiles, fishes, and birds, have a solid central point." He found also that the globules in the mammalia

* *Appendix to Gerber's Anatomy*, p. 13.

† *Allgemeine Anatomie*, Leipzig, 1841, p. 432, from *Paget's Report*, *British and Foreign Medical Review*, July, 1842.

are soluble in acetic acid, and leave no residue; while in the other classes of animals they are only partially soluble, for the nucleus resists the action of the acid.

On the other hand, according to Dr. Rees and Mr. Lane, the blood-corpuscle contains a fluid, and the corpuscle in mammals, as well as in the lower vertebrate animals, contains a *nucleus*. The corpuscle is $\frac{1}{3,250}$ of an inch in diameter; the nucleus is a thin colourless substance, of from $\frac{1}{4,500}$ to $\frac{1}{5,000}$ of an inch in diameter.* It would, however, appear that these observers describe the corpuscle, deprived of its coloured capsule, when they speak of the nucleus.

In the midst of these discrepancies from such eminent and recent observers, it is *non nobis componere lites;* yet we cannot help presuming that a great deal of these differences arises from the globules being examined under conditions not exactly similar; for while some keep them in the *liquor sanguinis,* and others diffuse them in water, or in acetic acid, Wagner examines the blood fresh from an incision and dilutes it with albumen, or white of an egg, or blood-water, kept at a tepid temperature. Otherwise it is found that simple water soon swells the globules by *endosmose* and the acetic acid very probably induces some coagulation in the contained albumen, so as to give rise to a granulated appearance, as has been alleged by Guterbock and Henle in regard to the nuclei of the pus-globules.

It is very curious that Harting shows some startling analogies between the forms assumed by some

* *Guy's Hospital Reports,* October, 1841.

inorganic precipitates and the forms of the nuclei and cells of organic matter. Ascherson also attempts to explain the development of all primary cells, by showing that when a minute drop of oil or of fat is placed in contact with a solution of albumen, it is directly coated with a capsular film of the latter.*

In addition to what has been stated as to Dr. Barry's observation on the nucleus of the blood-corpuscles, he has more recently† worked out his investigations into the structure of the *nucleus* itself, and has found it to consist, in the mammalia, of a flat filament, which is composed of his formerly discovered discs, and rolled up in an annular form; while in birds, amphibia, and fishes, this filament is so long that it is coiled up or overlapped similar to a ball of twine. He has also seen the ring formed in the blood-corpuscles of man, and the coils in that of birds and reptiles gradually unwinding themselves into straight and parallel filaments—changes which may also be seen occuring in blood before its coagulation. These are deeply interesting observations; and, when placed among the acknowledged facts of the science, will give a proud triumph to the microscope and their discoverer. In relation to this subject we may notice, that Mr. Addison, in describing the exceedingly delicate fibrinous filaments which he observed in blood during its coagulation, and which were perfectly independent of either the red or colourless corpuscles, or of the molecules in the *liquor sanguinis*, says, in reference to Dr. Barry's discovery, that the fibres which he observed did not

* *Paget's Report* in the *British and Foreign Medical Review*, July, 1842.

† *Proceedings of the Royal Society*, No. 51, 1841–2.

proceed from the unwinding or uncoiling of any filament connected with the structure of either of them.*

The automatic contractility of the blood-corpuscles is another very curious and important subject, as it affects the doctrine of the vitality of the blood. This has been observed also by Dr. Barry in the primitive discs exhibiting an inherent contractile power, and in the nuclei being furnished with ciliæ, by which they seem to revolve and perform locomotion.† Similar observations have previously been made by Schultz and Ebermeyer, who compared the motions of the corpuscles to that of infusory animals. But, if we understand Leuwenhoeck correctly, this ciliary motion is no new discovery; for, in describing what he observed by the microscope in the blood of animals, he seems to have anticipated much that has been talked of as new. He says—"*Quod potissimum mirabar, in sanguine, observabam magnum numerum vivorum animalculorum, longitudinis fere et latitudinis dimidiæ cum ima ovali particula sanguinis; animalcula hæc natatu suo in ovalem sanguinis particulam impingentia elegantem mobilitatem causabantur. Hæ enim sanguinis particulæ in gyrum agebantur.*"‡ This ancient author also figures the blood globules in a manner quite similar to what they are in Wagner's modern and beautifully executed plates. He also describes and gives good figures of the blood-globules in the ray and cod, as containing *nuclei* formed of five or

* *London Medical Gazette*, 15th April, 1842.

† *Philosophical Transactions*, 1341–2, p. 228.

‡ *Opera Leuwenhoeck*, Nuremberg, 1684, p. 68.

six *nucleoli*, or what Dr. Barry would call the primitive discs.

Differences also continue to exist among observers, as to the development and origin of the globules of lymph, mucus, and pus, and they seem much at issue as to what constitutes a parent cell, a *nucleus*, a *nucleolus*, and a *cytoblast* or *germ-vesicle*. To collate and systematize all this nomenclature of microscopics is extremely desirable, but not an easy task, and far less would it be a judicious employment of any portion of our time on this occasion. We may however remark, that Schwann and Valentin consider the blood-globule to be a cell; and while the former terms it a nucleated cell, Valentin considers it a nucleus, while the object, usually termed a nucleus, is held to be a nucleolus. Again, while Mandl states the pus and mucus globule to be the same as the fibrinous globule, Dr. Barry considers it to be the altered nucleus of the blood-corpuscle. Dr. B. also says, that his disc, which is one of the six or seven organized divisions of the nucleus, is synonymous with the basin-shaped granules of Vogel and the spherical molecules of Mr. Gulliver, as seen in the globules of pus.* The molecules or granules observed by Mr. Addison,† appear to be the same as these minute spherical bodies; and his colourless globules, having a diameter of $\frac{1}{2,800}$ to $\frac{1}{3,200}$ of an inch, to be similar to the lymph or fibrinous globules of other observers, though they cannot be the altered nuclei of the blood-corpuscles, as they exceed these in diameter. Dr. Barry holds

* *Philosophical Transactions*, 1841–2, p. 220.

† *London Medical Gazette, loc. cit.*

his disc to be the most primitive object with which we are acquainted in animal organization; and that the division of a nucleus into discs is universal, all being developed from the interior of each prior cell, as the germinal vesicle in the ovum. Dr. Remak and some others aver, that they have observed the generation of the blood-corpuscles, as parent cells, not within the blood, but in the cells, which line the walls of the blood-vessels and lymphatics; while others, as most of the German physiologists, regard the *liquor sanguinis* or *cytoblastema* as the generative source of the cell, independent of previously existing corpuscles, and that they acquire their further development by a sort of accretion—which latter view is maintained by Reichart, and is somewhat countenanced by the gradual increase and perfection of the molecules of the chyle, as they are developed into the blood-globules. It is very probable however, that the cell-germs are generated by both modes—from parent cells or from *cytoblastema,* as Dr. Carpenter seems disposed to think in his very valuable notice of this subject in his *Principles of Human Physiology.* However differently observers may have described the formation and internal constitution of the blood-corpuscles, and the existence or not of the *nuclei* and *nucleoli,* yet the latest microscopists have agreed with Schwann, Henle, and Mandl, in the existence and structure of the primitive cells, which are now allowed to be the foundation of all animal and vegetable organism. Wagner more recently corroborates this doctrine, by saying that the smaller blood-corpuscles have as much the form of a cell as

those observed forming the elements of all animal and vegetable tissues ;* and Gerber holds his cytoblasts to be analogous to the primary cells of Schwann ;† and, lastly, Dr. Barry considers every structure of the body, even the spermatozoa and the ovum, to arise out of the corpuscles, having the same appearance as those of the blood, and to which general, if not universal, identity he has found no exception. He even considers the crystalline lens may have its origin in a single corpuscle, having the same appearance as a corpuscle of the blood.‡

The whole subject of this portion of microscopic anatomy is certainly deserving of renewed and multiplied attention, so that some conclusions still more satisfactory may be received and adopted by the scientific public ; at least it is very desirable, that a uniform nomenclature be used for the same objects and processes in nature, as the structure, composition, and physiology of the animal fluids are likely to be more studied and enhanced in all medical doctrines and practice.

The important field of the anatomy and physiology of the capillary vessels still continues to engage repeated attention at the hands of a few observers ; but it must be acknowledged that little advance has, after all, been lately made in this subject, beyond the more full illustration of the mere dynamical powers at work. Among the more recent labourers in this interesting department, Monsieur Poiseuille, in his Memoir, has greatly

* *Lehrbuch de der Physiologie,* part ii., sec. 92.

† *Gerber's Anatomy,* by Gulliver, p. 55.

‡ *Philosophical Transactions,* 1841-2, p. 241.

elucidated some of the more intimate operations of nature in this system of vessels. What he has produced, as being thought new and important, is, that the capillary rete of vessels do not contract, but only appear to do so, from the diminished thread of red globules in them—the rest of the calibre of the vessel, even sometimes to the extent of two-thirds, being filled or lined with a thicker bed of serum. This *couche* or bed of limpid serum gives a transparent boundary to each side of the vessel, which appears to have led Haller to suppose, that this was owing to the contraction of the inner tunic of the vessel. This layer of serum diminishes when the circulation is lively, or even normal, even to one-fourth of the area—the rest of the diameter being proportionably filled with the red globules, while the layer increases as the circulation is enfeebled by cold, debility, congestion, or the weakness of the heart. This latter condition will be the spastic state of Cullen. Mons. Poiseuille denies any *vis insita* or infusorial power in the blood-globules themselves, or indeed any motive power to the capillaries of themselves. An argument, that has been held of some cogency against the capillaries having an independent moving power on the blood, is drawn from the fact noticed by Mons. Poiseuille, of the blood being at rest near the walls of the vessel, while towards the axis it moves with more or less rapidity.

Gerber has shown how he observed the capillary rete to be formed by a kind of pullulation of the blood-corpuscles, through the *plasma* or deposit of fibrine. Joseph Berres, of Vienna, as noticed in

Dr. Voigt's Inaugural Thesis, has also investigated this part of the circulation with great minuteness and intelligence. What has been usually called the capillary plexus, or rete, he terms the *intermediate* system, which vessels have, according to him, only one tunic, and a nearly uniform diameter, not larger than $\frac{1}{1,250}$ of a Vienna inch. He finds that the capillary arteries and veins only penetrate the interstices of the lobules of the glands, while the *intermediate* system is incorporated in the proper structure of the glands. He has also traced those vessels, by tubular continuity, into the excretory and secretory vessels and ducts of the liver, kidney, and through the substance of the spleen. Wagner has, in continuation of this view, ascertained that the *intermediate* vessels alone surround the cells of the lungs, and that both the arterial and venous vessels of this system arise from, and terminate directly in, the leading capillaries of both kinds in the lungs, by sieve-like orifices in their walls, without any gradual division or previous coalescence of branches, as in other vessels. This physiologist also considers the intersecting fibres among the air-cells to be elastic—keeping the cells patent, and not of a contractile nature, like intestinal fibres.* How far these investigations of Wagner are reconcileable with the observations lately made by Drs. Williams and Addison,† I will not now attempt to explain.

Dr. Jas. Carson, in a paper read at the last meeting of the British Association, showed that one

* *Op. cit.*, sec. 174, 176.

† *Medico-Chirurgical Transactions*, vol. vi., part ii.

use of the muscular fibres of the bronchi was to contract at will, or involuntarily by reflex action, the bronchial calibres, and so allow greater room for the expansion of the vesicular parts—thus occasioning a species of undulation in the atmospheric wave throughout the lungs. He also showed that a cubic inch of air in the bronchi would serve to give expansion to 400 square inches of vesicular superficies of the extreme air-cells; and as the vesicular expansion is confined, so will the bronchial cavities be enlarged, and *vice versa*.

Since we have touched upon the extreme branches of the pulmonary vessels, we may as well see if anything new or definite has been lately ascertained about the central organ of circulation. Physiologists in this country have of late been generally inclined to subscribe to the conclusions, which the medical committee under the "British Association" have drawn up from the ample and sacrificial experiments, which they instituted to verify the sounds and motions of the heart. Several of our Gallic brethren seem not disposed to pay the same deference to these experimental inferences; and in some corroroboration of their dissent, Nature seems lately to have revealed to them a working specimen of the actual machinery, in a case of complete *ectopia cordis* without the pericardium, that came under the observation and examination of Cruveilhier and others in July of last year.* From the observations made by Cruveilhier, he felt assured that the first sound of the heart arose from the raising back of the sigmoid valves against the walls of the artery,

* *Gazette Médicale, Août*, 1841.

in contra-distinction to what the committee inferred, that it was mainly owing to the *cardiac muscular tension,* preceded by the sonorous effect of the *abrupt closure* of the *auriculo-ventricular* valves. Cruveilhier also observed, that during the systole, a spiral or turnscrew motion took place from *right to left,* and from behind forwards, causing the percussion that would take place against the ribs, which has been independently observed by Dr. Kuerschner, who, however, says the motion in systole is from *left to right.** Bouillaud still maintains his opinion of the first sound being due to the *claquement* of the auriculo-ventricular valves, and the second to that of the sigmoid. This recent case of Cruveilhier, in a manner, confirms the observation made by Dr. O'Bryen on a case of *ectopia,* which was published in the 6th volume of our *Transactions,* that the ventricle was enlarged as much as contracted by an active force. It was dilated, he said, even under forcible pressure by the fingers; while Cruveilhier says, "One can form no idea of the force with which the dilatation overcomes any pressure upon the heart, the closed hand is so violently opened," both of which observations are somewhat at variance with the report of the committee, which is, "That the ventricular diastole and dilatation is wholly passive, exerting no influence over the venous current.†"

Viewing these and some other statements on the great *primum mobile* of the circulation, the *laudator temporis acti* is almost inclined to regret that the

* Müller's *Archives*; *British and Foreign Review,* October, 1841.

† *Transactions of the British Association,* 1840, p. 205.

old theory of Harvey had ever been questioned, so that the dogmas of his *alma mater* might still have descended with him to the grave, enhanced by the halo of unalterable truth and the reverence of ages.

Nerves.—The high interest, that has been of late years taken in the structure and functions of the nerves, has somewhat subsided—not, we are assured from its want of importance and of intrinsic value in all our medical studies and treatment of diseases, but principally from the idea, that the descriptive anatomy of the nerves is nearly exhausted for the present, and that the physiology of the system has, by general consent, been placed on the basis of the beautiful and valuable researches of Bell, Hall, Reid, Majendie, Flourens, and Mayo, among our modern physiologists. A confirmation or correction of the doctrines and observations of these eminent men, now seems to be left to the recurring revelations of morbid lesions, as they arise from adventitious injury or spontaneous disease; and though several phenomena occasionally occur that put some of these doctrines to a severe test, yet, on the whole, much independent testimony is from time to time affording them fresh support and illustration. One object still thought wanting to confirm the views now very generally entertained of the reflex function, is the identifying the anatomy in man, of those nerves, or of those nervous fibres, that are specially appropriated to the excito-motory functions; though there are some very rational ideas about them being connected with the grey strands going to the cineritious matter of the cord, along

with the other roots of the nerves. They are there said to be reflected into the white or motor fibres, as if from independent ganglions—similar to what is ascertained in the *invertebrata.** Dr. Paton, in a late paper, has endeavoured to show, from several experiments on frogs, that though many actions, which he details, were truly reflex, even to affect the limb opposite to the one irritated, yet they were not dependent on exclusive excito-motory nerves, and that it cannot be laid down as a general principle that there is one set of nerves connected with the medulla spinalis, and another with the cerebrum.† Dr. Paton's experiments, however, do not invalidate the doctrines of Dr. Hall; the difference seems chiefly to depend on the different mode in which motions, called reflected, are interpreted, as arising either from volition, organic sensibility, or unconscious action. Relative to this subject Dr. Remak says, in a nervous bundle there are three sorts of primary filaments—the motory, sensory, and organic, which do not communicate in the most intimate plexuses. In organic life there is an organic perception, or what is called reaction or the function of organic reflexion: he also says, the organic filaments which proceed from the ganglia to the spinal marrow are by degrees lost in the spinal axis.‡ In opposition to some other observations of Remak, as well as of Retzius and Müller, Dr. Todd can discover no other elements in the organic nerves but nerve-tubes containing white

* Dr Carpenter's *Elements of Human Physiology*, 1842, pp. 113-136.

† *Edinburgh Medical and Surgical Journal*, April, 1842.

‡ *Ammon's Monatschrift*, June, 1840; *Medico-Chirurgical Review*, April, 1841.

matter, every way similar to the nerves of animal life—the large quantity of areolar tissue producing the apparent difference, which is physiological, but not anatomical.* Gerber compares the ganglionic globules, in form, to unimpregnated ova, and says, that they are found in the grey matter of the brain and spinal cord, and in the trunks of nerves, where those of sensation and motion come in contact.†

Into the *genesis* of the nerves Dr. Barry has carried his microscopical researches, and has verified, in its first stages, the corpuscles of the optic nerve in their original elliptical form. In the nerve more advanced, the globules surrounding the primitive nuclei had very much disappeared, and the corpuscles were pressed into polyhedral forms.‡ The elements of the retina afforded ample proof of their origin in corpuscles, similar to those of the blood. Gerber observed in the nervous tubes a delicately investing membrane, composed or covered with a ciliary epithelium—the cilia of which lie obliquely and spirally, thus approaching to a vascular tissue, and promoting the nervous current to and fro.

Different observations have been made on what is called nervous matter; but the report of our most recent observers, as Valentin and Henle, is, that it is a pellucid or opalescent, and a viscous and homogeneous substance in the living state, but its structure is soon changed after death into a beaded or varicose form, which, it appears, has led some to

* *Croonian Lectures* for 1842.

† *Gerber, ut supra*, p. 266.

‡ *Philosophical Transactions, ut supra*, p. 233.

suppose that the nerves have varicose fibres as their natural and living structure.* Two Italian physicians, Drs. Pacini and Guarini, speak of the discovery of minute globules situated along the course of the median, cubital, and plantar nerves, as well as upon the epigastric plexus. Each globule is an aggregate of numerous capsules inclosed one within the other, with a fluid interposed. They would have these globules to be compared to the electric apparatus of the torpedo, and to be animal magneto-motors.† These alleged discoveries I however leave to the curious in microscopical metaphysics, or rather to the animal magnetiser, without comment. Messrs Günther and Schon have proved, from numerous experiments on rabbits, that nerves are capable of regeneration and reunion ; the matter, which unites the two ends of a divided nerve, is at first amorphous, but by degrees primitive fibres shoot through the mass, and become visible eight weeks after the division. The sensibility is slowly restored, or never becomes perfect, from the regenerated fibres occasionally being united to different primitive fibres, so that the sensation was not always referred to the proper place, and from this cause the influence was long delayed.‡

The question, how far muscular irritability is dependent or not upon the nerves, is always an important one ; but in addition to the corroboration which of late years has been given to the Hallerian doctrine, M. F. A. Longet has also adduced a great

* *Paget's Report,* from *British and Foreign Medical Review,* July, 1842.
† *Annali Universali di Medicina,* March, 1841.
‡ *Archives Générales de Médecine,* March, 1842.

many trustworthy experiments in support of the same views.* He says, a motor nerve, separated from the cerebro-spinal axis, loses its irritability after the fourth day, and the muscle is immoveable by any chemical, mechanical, or galvanic stimulus applied to the nerve; but at the end of twelve days, the muscle oscillates from an irritant applied to its own fibres. Irritability, according to him, is a power inherent in the living muscles, and is thought independent of the motor nerves, yet requires for its support the concurrence of the sensitive and organic nerves, and that of arterial blood. These conditions seem necessary, not to communicate the property or power in question, but only for to maintain nutrition, without which any vital property disappears in any organ whatever. This view of M. Longet approaches nearer the true physiology of nature than any of the exclusive views that have been held on this subject.

Dr. J. Heine, of Germersheim, has lately attributed the action of the heart to the cardiac nerve: the interruption of its continuity, he says, destroys the action of the organ.† And Dr. Remak has claimed the discovery of nervous ganglia in the heart of man and of other animals: they are derived from the sympathetic, and are microscopic. Upon them depends, he says, the contractility of the heart, independent of the brain.‡

Muscle.—In addition to the highly valuable researches made by Mr. Bowman into the structure

* *Comptes Rendus*, December, 1841.

† Müller's *Archives*, Heft. iii., 1841; *British and Foreign Medical Review*, October, 1841, p. 525.

‡ *Wochenschrift fur die gesammte Heilkunde*, No. 10.

of voluntary muscle, which have been duly noticed by my able predecessor, the same talented gentleman has since made some interesting inquiries into the contraction of muscular fibres.* His observations are principally derived from examining human tetanic muscle; and his principal deductions are, that "*the contraction of a muscle is the principal cause of its own rupture;* that *there is no repellent force between the contractile elements of muscular fibre;* and, *that the contraction of a voluntary muscle is not a sustained act of the whole congeries of contractile elements composing it, but a rapid series of partial acts, in which all duly share, becoming in turns contracted and relaxed.*" Thus Mr. Bowman would compare these partial contractions to a rapid vermicular motion, and that when rupture takes place, it is in the uncontracted part not being able to resist the violent retracting power of the contracting parts. He also considers it nearly impossible that any rupture can take place in a muscle by a contraction, consisting of an absolutely simultaneous and uniform approximation of all its elementary parts. Though Gerber is not very explicit on this, he on the whole corroborates Mr. Bowman's former statements. He says—The transverse striæ appear not to obtain beyond the surface of the primary fasciculi, while the interior fibres are longitudinally streaked; but, again, the primary fasciculus is formed by transparent cells, which arrange themselves in rows, and become flattened together like blood-discs, and from four to eight of these granulated or nucleolated ranks

* *Philosophical Transactions*, part ii., 1841.

of cells lying in the diameter of a fasciculus, the appearance of transverse striæ is effected. According, also, to Gerber, no voluntary muscle is known without transverse striæ, except those of the heart and œsophagus near the cardia, which muscular organs stand between the animal and organic systems.*

Dr. M. Barry, in recommending Mr. Bowman's first published observations on muscle, speaks, in his late paper, of corpuscles more or less red, like young blood-corpuscles, applying themselves one to another, and forming a necklace object, which is the primitive element of the muscular fibre. These corpuscles are cells filled with discs, and by degrees the muscular cylinder becomes more perfect, as the partitions between the cells disappear.† The following facts he considered as new:—the more or less red colour of the original cells; the presence of discs in their interior; the derivation of these discs from the nucleus; the existence of an orifice at a certain part of the nucleus, and a continuation of these appearances in the muscular cylinder or secondary cell. The indefatigable industry of Dr. Barry has not long remained satisfied with this progress in his discoveries; for he has since communicated to the Royal Society‡ fresh results of his inquiries, by the aid of the microscope, as to the constitution of fibre in animal and vegetable structure. Having observed all primitive fibres to be formed from uncoiled discs, he says, these fibres all soon take on the spiral form,

* *Gerber, op. cit.* pp. 242, 248.

† *Philosophical Transactions,* 1841–2, p. 235.

‡ *Proceedings of the Royal Society,* No. 51.

whether derived from discoid cells, or corpuscles, or from the blood of animals; and that nervous tissue, muscle, minute blood-vessels, and the crystalline lens, all afford proofs of the spiral form. The filament is flat, grooved on both sides, that forms the muscular fibre, and is so situated in the fasciculus as to present its edge to the outer investing membrane of Schwann, and the sarcolema of Bowman. A muscle, according to Dr. Barry, is no other than a vast bundle of spirals: it is in contraction short and thick, while in relaxation it is long and thin; and thus there is no flattening of beadlike segments in contraction. Dr. B. also further states, that the longitudinal muscular fibrillæ have no concern in the production of the transverse striæ, which are occasioned by the winding of the spirals, within which the longitudinal filaments have their origin. Now these latter observations are so different from those of Mr. Bowman, that it is much to be regretted by the scientific public, they have not been announciated with more clearness and precision, and more in accordance with the doctrine of primitive cells, so ably promoted by this discoverer himself. To the latitudinarian philosopher, the blood and its *plasma* may, at times, seem to be the source and theatre of all sorts of forms and changes—subject not only to the controul of the vital principle, but also to the mental affection of the enthusiastic inquirer.

Non-vascular tissues.—The mode of nutrition of certain tissues of the animal body has often been a desideratum with physiologists, since no blood-vessels could be traced into their textures. Mr.

Toynbee, from a paper read before the Royal Society last year, has succeeded in throwing some light on this obscure subject; and it appears to him, that the only difference between the vascular and non-vascular tissues is, that in the latter the nutrient fluid exudes into them from the large and dilated capillary vessels which are distributed around them, instead of being directly conveyed to the part, as in the former class. He reckons the non-vascular tissues to be, first, the articular fibro-cartilages; second, the cornea, lens, and vitreous humour; and the third class, the epithelium, epidermis, hair, nails, hoof, horn, and teeth. All these are composed of corpuscles, to which he ascribes the very important function of nutrition, of circulation throughout, and, perhaps of changing the nature of the nutrient fluid which is brought by blood-vessels to their circumference. His object seems to be to establish a law in animal physiology, that tissues are capable of being nourished and increased in size without the presence of blood-vessels. The articular cartilage contains no vessels, but is nourished by *endosmose* through the delicate lamella of bone, which separates the cartilage from the cancelli of the shaft, and on the side next to, and round the circumference of, which there are numerous dilated blood-vessels distributed. In the intervertebral cartilages, though vessels are traced a little way into the fibrous part, yet the cartilaginous centre is entirely composed of distinct round cells, which become elongated toward the periphery. He makes the vitreous humour to be nourished from the vessels of the ciliary processes, which lie in the sulci of this humour. Mr. T.

also admits, that in the healthy state no vessels enter the cornea, nor into the anterior capsule of the lens, but that the posterior capsule can be injected easily; and he says, what I have not elsewhere seen noticed, that lines or objects, situated on the anterior surface of the lens, produce indistinctness of vision, while similar lesions upon the posterior surface leave the image perfectly clear on the retina. Allowing Mr. Toynbee's observations every weight which can be attributed to them, there is ample proof that many of these non-vascular tissues become quickly vascular from irritation; besides, the corpuscles themselves, in the softer textures, are the very framework of the *intermediate* capillary vessels, and several observers have noticed blood and fibrinous discs or cells to circulate through a *plasma* of the same, before any linear or defined vessels were formed. The art of injection has, besides, been of late much improved, especially by the use of separate limpid fluids, which, from being successively injected into the minuter vessels, are mutually decomposed, and the precipitate becoming solid and palpable, the capillary vascularity is brought out in a wonderful manner. Separate solutions of the acetate of lead and the bi-chromate of potass thus produce a fine yellow precipitate, filling up the minutest vessels seen by the moderately strong lens of a microscope.

Skin.—Anatomists have long been acquainted with the seat and functions of the follicles of the skin, and especially those which open at the roots, or the sacs surrounding the bulbs, of the hair. The mucous and sebaceous matters on the skin were

therefore attributed to a glandular secretion, while the insensible transpiration and sweat have been referred to an exhalant or transuding office of the extreme capillaries on the surface. The more rigid anatomy of the corium, and especially of its internal surface, has recently led to the localization of this office of transpiration; and Gerber and Wagner have more definitely described and figured this apparatus, which is also glandular. These glands have also been particularly examined by Gurlt:* they are larger than the sebaceous glands, are of a convoluted or sacculated texture; they are situated under the corium in the fatty and cellular layer, while their tortuous ducts penetrate the corium, rete mucosum, and epidermis, either distinct, or in company with the involuted glands of the epidermis and the sebaceous follicles, which are situated in the substance of the corium. Gerber attributes not more than the sixth of the secretion of the skin to simple evaporation.† A more studied attention to the nature of these sudoriparous glands, will very probably lead to a better understanding of the conditions to be kept in view in promoting perspiration, and to a more useful appreciation of our therapeutic means for that purpose.

The mucous membranes, with their epithelial coverings, have been examined and described, with delineations, by Mr. Bowman, in a more minute and systematic manner, than has been hitherto done. He nearly follows Henle in the classification of the several forms which the epithelial particles

* *Magazin für die gesammte Thierheilkunde*, and Müller's *Archives*, 1815.

† *Gerber op. cit.*, p. 144.

assume, and more fully proves, that this structure is present throughout the mucous system, and in most situations, it is so abundant as to constitute nearly the whole of the tissue of the membrane. This fact, as yet so novel, makes the study of this structure under its varied forms peculiarly interesting and important. Mr. Bowman has even depicted the two strata of epithelial particles in the tubule of the sudoriferous gland; and he has noticed the prismatic-formed epithelia with vibratile cilia in the respiratory tract, the uterus, and fallopian tubes. Altogether his paper on this subject, in the 23rd part of the *Encyclopædia of Anatomy and Physiology*, is highly worthy of perusal and study.

M. Flourens has also lately examined the structure of the mucous membranes, and found every one of them, however thin, to be composed of three distinct laminæ—the derm or skin, the mucous body, and the epiderm, all placed one over the other.* We must not omit noticing the valuable light which Dr. Todd has, in his *Croonian Lectures* for this year, thrown upon the mucous membrane of the intestinal canal, illustrated also by very clear and intelligible engravings, and confirming, in the minute anatomy, the observations of Mr. Bowman. Mr. Goodsir, of Edinburgh, has also investigated this subject, and has described the lacteal vesicles in the intestinal *villi*, previous to their solution and absorption by the lacteal vessels.†

Teeth.—The minute anatomy of the teeth has been further elucidated by Mr. Nasmyth, who, in

* *Gazette Médicale*, No. xxx.

† *Edinburgh Philosophical Journal*, July, 1842.

his memoirs published last year, has added to the accuracy and precision of our general knowledge on this subject. Though he agrees with many of his predecessors in this department, as Tenon, Purkinje, Retzius, Ratschow, and Cuvier, as to the intimate structure of these bodies, and that they are organized structures, similar to bones—the pulp of the teeth becoming gradually ossified by the deposition of dental matter of the same corpuscular size as the cells of the pulp, yet he seems not to have been able to discover in what manner the osseous matter is deposited in the cells of the interfibrous tissue. Gerber has served to throw a few cross lights on the subject of odontology—such as, that the prisms of the enamel unite with the bone cells, which half penetrate the enamel in the same way as the fibres of the tendons unite with the conical ends of the primitive muscular fibres.* He also notices Mr. Nasmyth's *persistent dental capsule*, which he traces over the whole surface of the enamel; and that, in the fœtus, the crown of the tooth is strengthened by constant additions from the pulp within, and augmented by additions from the enamel membrane without, while the internal cavity is in the meanwhile gradually lessening.†

Bone.—Some very interesting and instructive experiments have been instituted by M. Flourens, on the development of bone, principally as relating to necrosis, in addition to his former researches on the longitudinal growth of bones. From them he concludes, that when a bone becomes dead from the

* *Gerber, ut supra,* p. 196.

† *Ibid,* p. 204.

medullary membrane being destroyed, a new medullary membrane is forthwith formed on the internal surface of the periosteum, but at first constituting with it only one membrane. By degrees this double membrane becomes thicker, its central lamina more dense, till a new osseous shell becomes deposited between them. With the gradual increase of the bony deposit, the medullary membrane, at first fibrous and thick, becomes of a finer texture, and its internal surface gets beset with grooves and *mamelons*, which act upon and finally absorb the dead inclosed bone. This membrane, after absorbing dead bone on one side, and depositing new osseous matter on the other, finally becomes a true medullary membrane. When again the external periosteum is destroyed, the medullary membrane, or the internal periosteum, takes on the office of the external membrane, and replaces it to a certain point. His final conclusions are—first, there is in the bones a formative tissue, and that is the periosteum; second, there is one of absorption, and that is the medullary membrane; and third, the medullary membrane is only a continuation of the periosteum.*

Eye.—All the textures of the eye have lately excited renewed study, from the great attention that has been paid to tenotomical operations on this organ, for the cure or relief of strabismus and myopia. The only claim to any anatomical discovery in the ocular apparatus has been made by Mr. Ferrall, in a paper read before the Royal Society.† The author describes a distinct fibrous

* *L'Experience*, October, 1841, No. ccxxiv.

† *Lancet*, August 14, 1841.

sheath, which he terms the *tunica vaginalis oculi.* It is continuous from the tarsal cartilages and ligaments in front, and extends backwards to the bottom of the orbit, thus insulating the globe, and keeping it apart from the muscles which move it. This tunic is perforated, at a few lines behind its anterior circumference, by openings, through which the tendons of the muscles emerge in passing to their insertions, and over which, as pullies, they play in their course of action. It however happens in these times of accumulating literature, which investigators have either not time or inclination to consult, that their discoveries in the wide fields of science are sometimes anticipated; so in this case it is found that Mr. J. Dalrymple, in his *Anatomy of the Human Eye,* and Mons. Bonnett, of Lyons, have previously described the vaginal sheath. Mr. Bennett Lucas speaks, in his paper read at the British Association last year, of two fasciæ on the eye-ball, which he calls the *sub-conjunctival* and *sub-muscular,* the latter of which seems to be identical with the sheath which we have noticed. To throw some more satisfactory light on the *chiasma* of the optic nerves, and on single vision with two eyes, Mr. Herbert Mayo has described, and illustrated by diagrams in the *Medical Gazette,* a very ingenious hypothesis of the distribution of the optic tracts to the two eyes, by showing that part of the right optic tract goes to, and is expanded on the right hemispherical side of the left eye, and that a corresponding part of the left tract is expanded on, the left side of the right eye—thus making a visible object, falling to the right or left

of the optic axis, always to fall on the nervous expansion of one and the same optic tract. The subject seems well supported from what Mr. Mayo instances in the conformation of the eyes in fishes, cats, dogs, and sheep. We cannot but here notice the highly interesting case of the gentleman, 18 years of age, born blind, who was successfully brought to the use of vision by Dr. Franz last year,* and also a more recent case of congenital cataract, that was successfully removed, in a patient 23 years of age, by Mr. Stafford†—both exemplifying, as the case of Cheselden did, that curious subject in ocular physiology—the ignorance or inappreciation of the distance from, and between, objects presented to the eye immediately after the acquisition of vision.

Liver.—The intimate structure of the abdominal organs still continues to engage the researches of both foreign and British inquirers, and none more so than those of the liver and kidneys. Among the continental labourers in this field, M. Ernest Lambron has particularly elucidated the vascular system of the liver. In addition to what he had formerly published, he has since, while confirming Mr. Kiernan's general observations, further explored the relative connection between the different vessels, and, by injections thrown into each separately, or at the same time, has shown the mode of the circulation of the different fluids throughout the organ. He has ascertained, that injections from the *vena portæ*, when forced, penetrated the granulations of the lobuli, coloured them from the circumference to

* *London Medical Gazette*, September 10, 1841.

† *Provincial Medical Journal*, May 11, 1842.

the centre, and finally were returned by the sub-hepatic or interlobular vein. When the injections were thrown from the sub-hepatic veins, the granulations were coloured from the centre to the circumference, and, afterwards, the injections were returned by the *vena portæ*. Injections by the hepatic artery coloured the liver very slightly, and were poured into the branches of the *vena portæ*, and thence reached the sub-hepatic veins; from which Mons. L. concludes, that the blood in the artery does not directly contribute to the secretion of bile until it has become venous. Again, when injections are pushed through the biliary ducts, the fluid circulates between the lobuli and circumscribes them, as injections from the *vena portæ* do, but do not form, like the veins, plexuses around them. Injections by the ducts never communicate with any blood-vessel, but only with lymphatics; which circumstance forms a good reason why jaundice very quickly occurs from any obstruction in the biliary ducts. The granulation or *acinus*, he says, is composed of a multitude of minute polyhedral cells, and is of itself a liver in miniature.* In addition to these beautiful views of the vascular system, Mr. Bowman has lately applied his talented research to this organ, and, in a paper, illustrated with very delicate engravings in the *Lancet* for January last, has shown the polyhedral cells of Lambron, or the *angular particles*, as Mr. B. terms them, to contain each a circular or oval *nucleus*, within which is a minute point or two, the *nucleoli*. These particles have a determinate

* *Archives Générales de Médecine*, 1841; from *Edinburgh Medical and Surgical Journal*, January, 1842.

outline, are of some thickness, possess a granular aspect, and contain one, two, or more globules of fatty matter. It appears, that these nucleated particles were first described by Purkinje and Henle, and by Mr. Wilson in this country; but the object which Mr. B. had more particularly in view in noticing this structure, was to show that these normal globules of fatty matter become much increased in some diseases of the liver; and that, instead of a few minute scattered globules of fat, the nucleated particles are gorged sometimes with large masses of it. This especially obtains in cases of tubercular phthisis, where the evolution of carbon by the lungs is so greatly interfered with, and therefore the excrementitious surcharge of this element is thrown upon the liver, and there deposited in this abnormal quantity, by which the whole viscus becomes enlarged. That the liver, in cases of phthisis, is often enlarged, is consonant to observation; but that the enlargement depended on fatty deposit has not been as frequently reported, might be owing, very likely, to the want of more minute observation. Louis, however, notices the meeting with the fatty liver forty-nine times, of which number of patients forty-seven were phthisical; and Dr. Watson mentions the liver in this disease becoming full of adipose matter, greasing the hands and scalpel.*

The final purpose which Nature had in view in devoting such a large organ as the liver to such a singular mode of circulation and secretion, still seems to exercise the minds of some physiological writers; for while Dr. Willis conceives the portal system is

* *London Medical Gazette*, vol. xxix, Dr. Watson's Lectures.

obvious to him as being "a contrivance—a most admirable contrivance, to economise arterial blood," and that the bile is necessary to the completion of digestion,* Professor Liebig considers the principal function of the bile to support respiration and produce animal heat, by presenting carbon and hydrogen, in a very soluble form, to the oxygen of the arterial blood, and the gall bladder may thus be called the soot-chamber of the animal furnace.† Mr. Hancorn proffers proof that the liver is not a secreting body, but is placed in the body for the sole purpose of acting as a filter, and that this is the true physiology of the liver. "If the bile," he moreover says, "were intended for assisting digestion, we should not have a nauseous, green, yellow, and, at other times, a black fluid."‡ Perhaps Mr. H. thinks, that a sweet and rosy nectar would have better suited the palates of the polyporiferous lacteals of the duodenum.

Mr. Shaw communicated some ingenious views at the late meeting of the British Association, on the circulation of blood in the liver, chiefly derived from the mechanism of the hepatic veins and the opening in the diaphragm.

These views have, however, been found anticipated by M. Berard in 1830, and by Dr. Carson in 1833.

Kidneys.—It has always been an object of great interest to ascertain, if possible, the anatomical connection between the *corpora Malpighiana,* in the

* *London and Edinburgh Monthly Journal,* September, 1841.

† *Liebig, op. cit.,* pp. 61-64.

‡ *Lancet,* August, 7th, 1841.

kidneys, and the seat of the urinary secretion, or the commencement of the uriniferous tubes. Since the unsuccessful attempts of Malpighi, by injections, to discover a continuous connection between the vascular and secretory vessels, no direct communication has yet been discovered between them, more than between the ultimate capillaries of the portal vein and the biliary ducts. Wagner, one of our latest investigators, says, that these globular convoluted knots of the extended arterial ramusculi lie, particularly, interposed among the blind uriniferous tubes, in the cortical substance, without any direct or vascular communication with each other.* He also gives some beautiful delineations of the relative structure in his *Icones Physiologicæ*. We are, however, indebted to the successful and brilliant researches of Mr. Bowman, for ascertaining, of late, though the fact seems not to have been unknown to Schumlansky, that, though no direct vascular connection exists between these Malpighian bodies and the uriniferous *cæca*, yet the connection is much more intimate than it has been hitherto presumed to be.† Instead of being in mere proximity to each other, the cæcal or club-like capsules of the terminal uriniferous tubes embrace the Malpighian bodies all round, and are attached to these bodies at their peduncle or collar—having their internal mucous epithelium continued over all, except the convoluted surface of the naked vascular body. Mr. B. has also shown, that there are two sets or systems of capillaries in the cortical or secreting

* *Lehrbuch der Physiologie*, sec. 193.

† *Proceedings of the Royal Society*, 24th February, 1842.

organism—first, the Malpighian bodies, composed entirely of arterial vessels, except having one central or intra-malpighian vein, which, secondly, after returning, is ramified as the capillary plexus on the outside of the uriniferous capsule—the venous blood from which plexus is returned by numerous radicles to the renal vein, thus establishiug, as it were, a portal trunk between the inside and outside of the capsule, which contains the Malpighian body. In analogy with this newly discovered arrangement, Wagner found that, in the amphibia and fishes, part of the venous blood from the posterior extremities, the walls of the abdomen, and the intestines, goes to the kidneys. It is doubtful, he says, whether the *material* secretion of urine is afforded by this blood; for the kidneys also contain larger arteries, whose ramifications form such ball-like bodies as are in the kidneys of the higher vertebrata, in which they are globular convoluted knots, formed by the extended arterial ramusculi, before they lose themselves in the minuter capillary network.* This dim shadowing forth of the German professor has been brought into clear and beautiful relief by Mr. Bowman, who has also founded on his discovery a theory of a double function of the kidney. He conceives that the aqueous portion of the secretion is furnished by the Malpighian bodies, and its characteristic proximate principles by the walls of the tubes. How far this recent knowledge of the real structure of the kidney may conduce to a more scientific pathology and better treatment of its diseases, and especially of the granular degenera-

* *Lehrbuch op. cit.*, sec. 198.

tion, it is perhaps not easy, at this stage of our information, to predicate; but it must surely form the groundwork of a more enlightened therapeia.

Ovology.—The very important and recondite subject of reproduction, which has of late excited so much inquiry and received such great elucidation from Dr. M. Barry, Dr. Coste, Schwann, Dr. Carpenter, Professor Wagner, and some others, still keeps up its deserved interest among the philosophical and curious inquirers into this secret process of nature. In addition to the elaborate and beautifully illustrated works of some of these eminent physiologists on this subject, we have been furnished with much relative investigation, from the translated work and *Atlas* of Gerber, published by Mr. Gulliver in this country. Dr. Barry still adheres to the future germinal vesicle being at first a mere disc—the most essential part of which is the depression in the centre of its surface; and when the germinal vesicle has really become vesicular in form, there is seen an orifice in the same situation.* Dr. B. and other observers now agree, that the germinal spot is the point of fecundation, and the place of the two cells which constitute the foundation of the new being. Gerber is also of opinion that the germinal spot is the primary foundation—the cytoblast or organic germ, from which the germinal vesicle is evolved, but that this is accomplished by the outward accretion of cells, and not from the evolution of the granular germs from within the primary cells; for he says,† hidden life in the fluid, in the *shapeable*, precedes

* *Transactions of Royal Society*, 1841, p. 242.

† *Gerber, op. cit.*, p. 27.

revealed life in the solid, the *shapen*. Gerber agrees with Dr. Barry and others, that the germinal vesicle disappears when the ovum quits the ovary, and in its place we have the disc-shaped germinal membrane, which, according to Gerber, in a short time, divides into two layers—the outer a serous one, the inner a mucous layer, while the space between them is spoken of as the vascular layer. From the serous layer are evolved the animal and external organs—from the mucous one the organic and internal parts, and from the intermediate layer the blood and vascular system are produced. These last partly expand in the vitellary cavity, and then begins the nourishment from the yolk.* Dr. Barry, in his paper on the Chorda Dorsalis, does not agree with Gerber and some other physiologists, as Baer and Reichart, that the chorda is an axis, round which the first parts of the fœtus are formed, nor that it is the support and stay of surrounding parts, but that growth, at the earliest periods, consists, not in external additions, but in the continual origin of new substance in the centre, by which means, previously formed substance is pushed further out. The nucleus of every cell, also, of which the embryo is composed, seems to be the seat of a like process—that is, a subordinate point of new substance.† It would be, I am afraid, a very unprofitable employment of our time, as I fear it is so already, if I were to attempt to reconcile these differences between the *ova ab ovis* and the *ova ad ova*.

In strict relation to the subject of reproduction,

* *Ibid*, p. 123.

† *Transactions of Royal Society*, part ii., 1841, p. 199.

in which the spermatozoa perform so essential a part, these bodies are considered by some recent physiologists to be analogous to the pollen grain of plants, and that the ovum receives its real germ from the spermatozoon, just as the ovule from the pollen grain, by the insinuation of the pollen tube into the vegetable ovum.* In addition to what Dr. Carpenter remarked, that the spermatozoon is nothing more than a long cell, endowed with the same kind of power of movement which cilia and oscillatoria possess, Gerber found these animalcules in the bear to have an internal organization. In the pig, he also found they had an oval papilla in front, and posteriorly an anal orifice. The two anterior thirds of the body are mostly occupied by transparent globular vesicles, like the stomachs of polygastric infusoria, and the posterior third includes two rounded very finely granular organs, which he is inclined to think are sexual organs or ova.† It is very curious that Leuwenhoeck, about 160 years ago, had described and delineated these globular vesicles in the spermatozoa of the rabbit: he calls them "*plerumque sex pellucidæ sublimitates, quas quidem globulos esse putabam.*"‡ He also notices the globules near the tail as being larger than those in the anterior of the body; and I think, if the remarkable work of this ancient microscopist were translated, and his plates re-engraved, that modern science would have a starting point, from which we might more easily

* Dr. Carpenter, *London and Edinburgh Monthly Medical Journal*, September, 1841.

† *Gerber, op. cit.*, p. 336.

‡ *Opera Leuwenhoeck*, 1684, p. 168.

and fairly calculate the progress, which modern discovery has actually made in these investigations.

The most important, and, to many will be, the most startling of all the facts that modern investigations into the mysterious process of animal reproduction have led to, is that the male furnishes the *germ* and the female supplies it with *nutriment* during the period of its early development,* thus now making it doubtful to which sex the term fecundation should be applied.

While on the subject of embryology, I may notice a very general and warm discussion, which took place in the *Seances de l' Academie Royale de Medecine,* as to the existence of the chorion before the ovum enters the fallopian tube. To show how much this point divided the savans of the Academy, M. M. Blandin, Matthieu, Virey, and Bressol, denied the existence of the membrane extra-fallopian, which they could not detect in several inspections which they had the opportunity of making; on the contrary, M. M. Moreaux, Velpeau, Gerdy, and Morreau, maintained the existence of the chorion in all extra-uterine pregnancies, and that the ovum is evolved in a complete state from the ovary, having all its envelopes, and without which there could be no placenta nor nutrition. M. Virey adduced, in his arguments, for the non-existence of this membrane when the ovum escapes, the general opinion of English and German authors, but the majority of his compeers seemed against his view.† Perhaps the want of defining what was meant by the chorion,

* Dr. Carpenter's *Principles of Human Physiology,* pp. 616, 629, 652.

† *Encyclographie des Sciences Medicales,* October, 1841.

on both sides, might have promoted such an opposition of opinion; for it is likely that the *zona pellucida* was taken for the chorion by Velpeau and his party, as Wagner says the *zona pellucida* is called the *chorion crassum* by some anatomists.

Professor Bischoff, of Heidelberg, has observed the yolk within the *zona pellucida* to rotate on its axis, during its passage in the fallopian tube, and to be furnished with very minute cilia, by which the movement was accomplished: the ovum itself remained perfectly still while the yolk revolved. Such rotatory movements have also been observed in the ova of mollusca and polypes, and recently by Von Siebold and Ehrenberg in those of the *Medusa acrita*.*

Regarding the nutritive connection between the mother and the fœtus, which has been so intelligibly elucidated in its true and main features by Dr. Reid, and duly noticed by my predecessor, Mr. Dalrymple has since given a modified view of Dr. Reid's observations on this subject.† Instead of an artery and vein running side by side, forming apparently a single vessel, and terminating abruptly in blunted extremities, where the anastomosis takes place, he says, the placenta is made up of innumerable subdivisions of the umbilical vessels, terminating in beautiful coils and convoluted capillaries, which tufts are clothed by a prolongation of the endochorion derived from the fœtal surface of the organ. Each tuft is, in fact, a villus; that there are no defined cells in the placenta, but the nutrient fluids

* Müller's *Archives*, *heft* i., 1841.

† *Royal Medical and Chirurgical Society*, 22nd November, 1841.

of the mother are poured into the interstices of the tufts. He appeals to engravings in Wagner's *Icones* for a corroboration of his own independent views, and as differing from those of Dr. Reid, which certainly exhibit a difference in the capillary conformation of the vessels; but the main point of the nature of the maternal and fœtal circulation is not invalidated by Mr. D.'s investigations.

M. Raciborski has lately questioned the accuracy of M. Gendrin's, M. Negrier's, and of Dr. Robert Lee's conclusions, as to the actual rupture of one of the ovarian vesicles at each period of menstruation, and that the sanguineous discharge from the uterus was the result. Dr. R. says, in which many will agree with him, that though menstruation is dependent on the development of the ovaries, and that it is the direct result of nature's means to place the ends of the fallopian tubes and ovaries in relations necessary for fecundation, yet the sanguineous congestion necessary for these conditions, appears sufficient of itself to explain the occurrence of the hæmorrhage, without having recourse to any solution of continuity. Finally, he says, it is not sufficiently proved that the ovula arrive successively to maturity at each menstrual period, or that the mature ovum then approaches nearest the surface of the ovarium, there to become ruptured and give exit to a germ.*

PATHOLOGY AND THERAPEUTICS.

The progress of our knowledge of the nature of the abnormal and diseased actions of the body, continues to be, as it ever will be in this world, circum-

* *L'Experience;* Johnson's *Medical Review,* October, 1841.

scribed by our ignorance of the nature of the connection between life and organization, and of the intimate relation of mind to matter. We more especially experience this imperfection of our science, when we attempt to investigate the aberrations and morbid actions of the mental and sensorial powers, in order to arrive at some satisfactory localization and analysis of the various phenomena. Dissection has done much in identifying many morbid symptoms of the mind and senses with lesions of the encephalon and spinal cord; and pathological induction has contributed greatly to enlarge and establish the field of our knowledge on these highly important and interesting subjects. Notwithstanding, there are a multitude of points in this department, which, from the repugnance of medical philosophers to throw themselves on the broad sea of metaphysics, have been, of late, referred to some of the no less impalpable doctrines of phrenology. The tempting facilities of this modern science to explain mental phenomena, have led not a few, unconsciously, to believe that they were strictly adhering to the rigid track of an inductive philosophy, while they were only engaged in a species of complacent paralogism—which, being brought to the test of anatomy and structural lesion, as often broke down, however much the ground was shifted, upon which it took up a new position. We are by no means desirous, even if we could, to disparage the anatomical and physiological confines of this science, for we have ourselves been tempted to stretch its extreme boundaries in many of the *rationalia* of the manifestations of the mental and

moral faculties, but we have found that, as soon as we forsook the comparatively secure ground of natural science, and betook ourselves to the thirty-six points, the mists of metaphysics began to surround us; and we then thought the whole study of the subject might as well have commenced and continued in this airy region, without any reference to anatomical form at all. It must, however, be acknowledged, that this modern doctrine continues to be well received by many of our professional brethren, including even several of those who have many opportunities, in lunatic asylums, of testing many points in the science; and its several principles are at times advocated, in a very warm and enlightened manner, in some of our leading professional journals. As there has been little new advanced lately on this subject, I shall not trespass on your patience by any further remark, but proceed to notice some of the less airy affections of the brain and nervous system, as they have attracted our notice during the by-past year.

Hallucination.—One of the most singular and ingenious proofs, that has lately been propounded, as establishing the necessary dependence of mental hallucinations on the physical or organic changes in the brain, though the reasoning faculties may be sane on all ordinary subjects, is that adduced by M. Moreau, of Tours, from the effects of the vegetable extract, called *hachish* in the eastern countries. A few grains of it, according to him, produce all the mental manifestations of extatic delusion, revery, and hallucination; and it would be impossible, he says, to cite examples of intel-

lectual modifications more detached from matter, and which seem more independent of organism, and yet their origin is not to be doubted—it is truly material.*

Dr. Robert Paterson has made some excellent remarks on several appearances, which are found in the brain, and are often reckoned morbid and to be caused by a living process, but which, he thinks, are owing to *post mortem* changes, arising from aqueous imbibition or gravitation. The time of *autopsia* after death, he found, as might be supposed, to have much effect on these appearances. His experiments were made on dogs, which after death were hung up by the heels, or otherwise, before inspection. Pseudo-softenings were also formed by laying the brains of sheep in water for different lengths of time, when they presented appearances nearly similar to what Andral and some others have related of *ramollissement;* and the process of softening seemed to follow nearly the same steps through the encephalon, viz., the *septum lucidum* first, then the *peduncles* of the brain, and, lastly, the *pons varolii.*† In all cases, it requires great discrimination to separate real morbid from pseudo-morbid appearances, and especially where the vascular system is concerned, in the other organs and cavities of the body, as well as in the brain.

In the pathology of hydrocephalus, our respected associate, Dr. Green, has drawn the attention of the profession, more particularly, to the co-existence of this disease with tubercles in the brain, if not to this

* *Gazette Medicale de Paris,* No. 34.

† *Edinburgh Medical and Surgical Journal,* January, 1842.

morbid degeneration in the system, being the very general cause of the cerebral affection. His more available opportunities of witnessing this disease, in connection with its necropsy, have given his observations much weight in associating the scrofulous diathesis with the complaint.*

The operation of tapping the head, in cases of chronic internal hydrocephalus, has hitherto been considered as a sort of experiment, in the scattered instances in which it has been performed; but Dr. West has taken the trouble to collate the several cases and results of this operation recorded in the annals of the profession. He finds, out of fifty-six cases in which puncture was performed, that forty died within thirty-five days after the last puncture, and sixteen were said to have recovered—a proportion, though small, yet thought by him sufficient to justify the having recourse to the operation.†

Mons. Arran has given the pathological histories of thirty-one cases in males and sixteen in females, of hydatids in the brain, extracted from various medical writers and from his own observations; from all which he finds, that these entozoa are more frequent in childhood and adult age. The causes of them are unknown, and their most common symptoms are headache—twenty out of forty-seven cases having it, and paralysis, which is in general incomplete and opposite to the side, in which the greater number of them are found. The health and *embonpoint* were often good. The diagnosis of them are, slowness of invasion, intermittence in the progress of the complaint, gradual increase, but not regular;

* *London Medical Gazette*, February 4th, 1842.

† *London Medical Gazette*, April 15th, 1842.

absence, in the majority, of paralysis, and of reaction, except towards the latter part of the disease. Cancer in the brain, again, is marked by violent pains in the head, weakness of one side of the body, lesions of sensibility and intelligence, tumours or ulcers in other parts of the body, skin, pale yellow, and by the disease occurring in the aged. Tubercles occur chiefly in the young of a scrofulous diathesis, and are also marked by headache, continued or intermitted, frequently in one side of the head, and by paralysis, especially if it be partial.* Dr. Gobée has confirmed, in many cases, that the pain, which patients feel when their limbs are touched, in cases of locomotive paralysis, is a sign of softening, either of the cerebral substance or of the spinal marrow, and is more so than contraction of the limbs, according to Lallemand.† Dr. Gobée treats his cases of *delirium tremens* with the *muriate* of *chinoïdine*, made from the residue of the manufacture of the sulphate of quinine, and with large doses of tart. antimon., every half hour, till emesis is produced.‡ Dr. Kinswisch speaks of apoplexy in the abdomen in infants, and of its occurring also in the liver and spleen of those newly born.§ We are also indebted to Dr. Hughes and Professor Reid for paying some late attention to the cerebral affections of children; but little new or more satisfactory in the way of treatment has been proposed.‖ A peculiar epidemic meningitis seemed to have prevailed,

* *Archives Générales de Médecine*, September, 1841; from *Encyclographie*, December, 1841.

† *Archives de Médecine Belge*, January, 1842.

‡ *Ibidem*, p. 29.

§ *Encyclographie des Sciences Médicales*, November, 1841.

‖ *London and Edinburgh Monthly Medical Journal*, pp. 19 and 671.

last year, at Versailles, Rochfort, Metz, and latterly at Strasburg. Dr. Wunschendorf, of the latter place, details forty cases, of whom twenty-one died; and in the Military Hospital, 104 died out of 176 cases. The symptoms were, sudden headache, vertigo, vomiting, then delirium, convulsions, tetanic spasms of the jaws and trunk, coma, and, lastly, paralysis of the sphincters. Some sunk under the first explosion of the symptoms in a few hours, others in a few days, while in others, a lingering convalescence or death took place in one or two months. No inspections after death are reported.*

In connection with our limited retrospect of diseases of the brain, it appears, from several remarkable cases detailed by Dr. Dowler, of New Orleans, that the sudden and dangerous effects of solar heat, or the *coup de soleil,* are not projected on the brain, but upon the lungs. This seizure has commonly been regarded as similar to apoplexy. These cases, however, show, from the *autopsia* of the fatal ones, that the attack is truly one of asphyxia—arising probably from an universal lesion or exhaustion of the nervous system, but more particularly of that division necessary to the pulmonary circulation. The blood, which suddenly accumulates in the lungs, ceases to be arterialized. It was found not only to gorge the blood-vessels, but to be infiltrated into the pulmonary tissue. It even was found to penetrate the pleura in some, and to be effused into the cavities of the chest. What is further remarkable, several were seized, from two to four hours after exposure to intense heat, and died

* *Gazette Médicale,* from *Medico-Chirurgical Review,* October, 1841.

unobserved at their own houses; and the heat of the body continued very great for many hours after death, which is very similar to what has been observed in rapid death from malignant cholera in this country.*

Dr. Marshall Hall, with his continued assiduity, has, in his Fourth Memoir on the nervous system, endeavoured to appropriate the several diseases of this system to their separate origins or seats, as they occur in the brain, the spinal cord, and the ganglionic centres. To the first head he refers *hemiplegia, apoplexy, hydrocephaloid disease,* and *mania.* To the true spinal he refers *tetanus, hydrophobia,* and *epilepsy;* which last, according to him, occupies the limits between the true spinal and the cerebral. To the ganglionic system he appropriates *sinking* and a *shock,* though it is doubtful, he says, whether any diseases originate in this division, but that accidents may first be felt in it. But we may say, that such lesions in this system are better explained by loss of blood or injured irritability. How far Dr. Hall is universally correct in his views about irritation and counter-irritation, pressure and counter-pressure, I shall not now inquire; but he says very truly, "that the very same lesion occurring quickly will produce effects, which will be totally absent if it creep on slowly." In *hydrocephalus acutus,* he attributes the early symptoms to counter-irritation, and the latter ones, denoting torpor of the digestive tube, to counter-pressure. To counter-pressure he also refers hypertrophy of the brain, which may occasion convulsion, and he thinks the

* *New York Medical Gazette,* October, 1841.

tentorium may prevent the effects of pressure from *ramollissement* and other diffluent diseases of the cerebrum. He also discusses the great question, which has often been agitated, "Why, with similar symptons, have we dissimilar morbid appearances, and *vice versa;* and what are the diseases of the nervous system, in which are found no morbid appearances after death?" The chief reason alleged, is the difference in time; for the same sort of lesion will produce a difference in the symptoms, according to the length of its duration, though almost all diseases of the encephalon are alike at their close. No morbid lesion is expected from a *shock*, strychnia, nor from prussic acid; neither from the effects of alcohol, dyspepsia, nor from extreme cold. Though he found no spasmodic affection to result from many kinds of puncture, irritation, or laceration of the cerebrum or cerebellum, yet laceration or pinching of the dura mater immediately induced peculiar spasmodic movements of the eyeball, the eyelids, the head, &c., which he attributes to the trifacial nerve by the recurrent of Arnold. I need not say how far some pathologists differ from the fundamental views laid down in this memoir, as a guide to our practical deductions. Dr. Copland attributes many of the spasmodic phenomena, called reflex actions by Dr. Hall and by several others, not to irritation acting through the spinal chord, as a *point d'appui*, but as effected by stimuli acting directly upon the organic corpuscles and nervous fibrils entering into the organization of the part; and not even, in many instances, through the reflex

media of the ganglia themselves.* It is much to be desired, that our leading pathologists could see such evidence, as would induce them to be at one on this important point.

Many interesting cases are, from time to time, recorded in illustration of the recent physiology of the anterior and posterior roots of the spinal nerves, of which one is related by M. Moore, as occurring in the Hotel-Dieu, where a robust man was seized successively with loss of motion in one lower limb, and loss of sensation in the other. Both limbs, in a few days, fell into gradual and complete paralysis, and death ensued. On inspection, total softening was found from the first to the sixth dorsal vertebra. The intellect remained entire till death.† A remarkable case of alternate paralysis of the seventh pair also occurred to M. Constantin James, at the Hotel-Dieu. The mouth was first drawn to the right side, and then to the left, with an intermediate state of repose. Galvanism was successfully applied in this instance, under the direction of M. Magendie—one needle being applied over the parotid gland, and the other by turns, over the supra-orbital, infra-orbital, and mental foramina, in the same manner as was so successfully instituted in the case of excruciating neuralgia of the same nerve, which was noticed by my predecessor in his address.‡ Two singular cases are related by Signor Gaddi, of another species of alternating paralysis, where sensibility was lost on

* *Dictionary of Practical Medicine*, Article, Irritation.

† *Lancet*, September 18, 1841.

‡ *Gazette Médicale.*

several limited surfaces of the body, while the intervening parts retained their normal sensibility. One was connected with suppressed menstruation, and the other with amaurosis and constipation—all of which yielded to leeches, strychnia, purgatives, and mercurial frictions.*

The very important class of neuralgic diseases seem to acquire an increasing attention, as there is reason to suppose they will prevail with greater frequency, from the progressive refinement of our physical and social habits. So vague, however, has been our pathology of these complaints, that our means of relief or cure have been equally uncertain, and pregnant with the purest empiricism. M.Valleix, in his late Treatise, has entered very extensively into these affections, as they principally affect the subcutaneous and muscular nerves. He has paid particular attention to the radiant points or *foci* of the lancinating pains, and locates them, either at the place of emergence of a nervous trunk, or where a nervous twig traverses the muscles, or where terminal branches of a nerve are exposed in the integuments, or, finally, where nervous trunks become superficial during their course. He nowhere enters into the cause of the pain, whether it arises from pressure by tendon, fascia, bony canal, or from inflammation of the neurilema. In dorso-intercostal neuralgia, he points out three foci between the spine and sternum, whence the radiating pains mostly proceed, and where pressure is very intolerable; but it is difficult to associate any particular anatomy with these *puncta dolentia*. His treatment is nearly

* *Memorialia della Medicina contemporanea;* from *Gazette Medicale, Juillet* 10, 1841.

similar to what has been adopted in this country—such as, with belladonna, oxide of zinc, and in periodical cases, quinine or arsenic. In sciatica he places great reliance on ol. tereb., in ʒi. doses, three times a day, in the mode of an electuary. He recommends small blisters to the tender foci—the pointing out of which is the peculiar merit, as to priority, in the work of Valleix.*

Dr. Allnatt has a more simple view of these affections; all of which he attributes, as well as *tic* of the face, to irritation of the ganglionic nerves being propagated to the affected nerves, however remotely they may be connected with them. He applies all his remedies to remove vitiated secretions, and to correct the abnormal functions of the ganglionic centres, and, for this purpose, employs croton oil with aromatics, colchicum, tart. antimon., conium, hyoscyamus and ipecac., and is not in favour with mercury.† His treatment may be said to be more rational than his pathology is satisfactory. Dr. Martinet mentions having cured fifty-eight cases out of seventy, affected with sciatica and other neuralgies of the limbs, by the ol. terebinth., in doses of ℈i. to ʒi., shielded by honey, gum arabic, or calcined magnesia. He places great dependence on this medicine, even in neuralgiæ of the upper extremities and the face, where there is no organic alteration.‡

* *Traité des Neuralgies, ou Affections douloureuses des Nerfs, par* F. L. J. Valleix, Paris, 1841.

† *Tic Douloureux, or Neuralgia Fascialis, and other Nervous Affections, &c.*, by R. H. Allnatt, M.D., M.A., 1841.

‡ *Du Traitment de la Sciatique, et de quelques neuralgies, par Huile de Terebinthine,* 2nd edition, Paris, 1841.

Lungs.—Great and increasing attention is still applied to the pathology and curative indications of diseases of the thorax, as we are now much better acquainted withthe morbid changes that obtain in these complaints, than with those that affect any of the other internal organs of the body. While the diagnosis of the diseases of the cerebral organs makes but little progress, or is proved to be very unsatisfactory, if not deceitful, in many cases, and our therapeutical measures are almost confined to the mere regulation of the current of the blood through the encephalon, we have obtained a much more correct and scientific acquaintance with the seat and nature of morbid changes within the chest, and a better appreciation of the value of all remedies applied for their cure or relief. Though the physical mode of investigating pulmonary diseases was, for some time, mistrusted or declined to be used, from its threatening to supersede the long established semeiology, to which practitioners had been accustomed, and which they had devoted much pains to study; yet the modern modes of exploration have gradually advanced, and are now pursued and applied with greater attention and frequency than ever. Few professional men would now venture to give a detail or an opinion, on any case of pulmonary disease, important either by itself, or from the circumstances under which it is placed, without ascertaining the thoracic physical signs—for, in doing so, the practitioner finds he is not undervaluing, nor putting aside the rational symptoms, as these are found to be of as much use, if not of more real value than ever, while they serve to correct

the physical signs, when these may be either too partially considered, or exaggerated by some temporary acoustic cause.

In the study of an art so refined, and so newly introduced, as that of auscultation, it is not to be supposed, that it should at once arrive at such certain principles as might lead to undisputed indications in all cases. Minor differences have existed among our leading authors on this subject, to the present day, as to the exact indications to be drawn from certain acoustic phenomena, without our confidence being impaired in the great and really useful principles of the art. The principal modifications, that have been introduced to our notice, are those of Dr. Skoda, of Vienna, who considers pectoriloquy as no indication of a cavity, any more than bronchophony; it is only a stronger degree of this last, which, when very strong, a cavity may as well be diagnosticated. Ægophony, according to him, is a mere modification of bronchophony, and has no essential connection with the existence of a fluid in the chest. To the *amphoric* echo, also, the presence of a fluid is not necessary, and it is equally superfluous to produce the *metallic tinkling*.* In some corroboration of Dr. Skoda on this subject, M. Castelnaw conceives the only conditions necessary to produce the *metallic tinkling* are, a tolerably large cavity containing air, either with or without a fluid, and the communication of the external air with this cavity. The *amphoric ronchus* is merely a modification or exaggeration

* *Edinburgh Medical and Surgical Journal*, July, 1842, by Drs. Drysdale and Russel.

of this. It is not necessary, in either case, for bubbles of air to ascend up through a fluid from a pulmonary fistula, nor drops of fluid to fall upon an effused fluid.* I do not know how far these observations are found correct by a fuller experience in this country, but if they are so, they will, by no means, shake the generally established principles that are applicable to all commonly occurring cases, and perhaps a great deal of the differences might be reconciled, if we had all the same ear and the same auscultate *media*.

There have been considerable discussions, in the late periodical press, by Drs. Williams, Bird, Stroud, and Cowan, and by Professor Forbes, and Mr. Shand, of Glasgow, as to the mode in which sound is conveyed to the ear through the stethoscope. The *medical* philosophers generally contend for the aerial medium, while the *physical* insist, that it is through the solid fibres of the wood and the bony tube of the ear. When such men of science enter into discussions on this subject, there is surely much that may be said on both sides; but this, moreover, may be affirmed, that in whatever way the *extra-thoracic* dispute may be settled, the *intra-thoracic* one, between the followers of Laennec and Skoda, must follow. We may, however, remark, that the very perfect manner in which the respiratory and cardiac sounds can be perceived by the long flexible stethoscope or aural trumpet, exhibits a very good proof of the auscultatory sounds being conveyed by the column of

* *Archives Générales de Médecine*, October and November, 1841; from *British and Foreign Medical Review*, April, 1842.

confined air alone, though the stroke-sounds may be better heard by a solid stethoscope, according to Dr. Williams's view. The art of percussion still continues to receive great practical refinement from M. Piorry, who is reported to map out easily on the surface of the skin, with ink, the size and form of the heart, arch of the aorta, liver, spleen, kidneys, &c., and indicate, to $\frac{1}{8}$ of an inch, the exact height of pleuritic effusion, or the margin of pulmonic dulness. Dr. John Hughes Bennett, in speaking of the proficiency of this master of the art, describes a plexímeter and hammer, with a caoutchouc nozzle, of M. Piorry's invention, which promise to facilitate much the researches of percussion. By means of these instruments it is alleged, that the nature of abdominal tumours may be arrived at, whether they be *fungus hæmatodes*, scirrhus, encysted, osseous, &c., from the different degrees of resistance which they offer; and it may also be determined, whether an enema, or a purgative by the mouth, is likely to open the bowels more rapidly, from the dull sound being found in one or other of the iliac fossæ.*

Tubercles and Phthisis.—Considerable difference of opinion still exists among pathologists, as to the generation and development of tubercles, as found in the lungs—whether they are the physiological result of a low inflammation, or are a peculiar deposit from the blood, formed by the aggregation of certain morbid or semi-organized molecules, or whether they are an abnormal growth, of the nature of hydatids. Their primary localization is also un-

‡ *London and Edinburgh Monthly Medical Journal*, February, 1842.

settled. Gerber considers these deposits may arise from any arrestment in the capillaries of the lungs, by which an exudation of the *plasma* or *liquor sanguinis* takes place through the parietes of the vessels into the parenchymal tissue, and so the tubercles are formed—thus making them a mere exudation of albumen, if not of fibrinous globules. Lugol considers their formation to be an *epigenesis*—organized matter capable of nutrition, similar to parasitical growths in other parts, such as in the case of hydatids, intestinal worms, and *pediculi*. All these parasitical complaints are held to be much more frequent in scrofulous habits than in others; and he denies that tubercles begin to soften first in the centre, but equally throughout—being previously quite homogenous in their texture. As a proof that tubercles are endowed with vascularity, Lugol has met with two instances of hæmorrhage in their interior; and, according to his latest opinions, tubercles are no more to be looked upon as devoid of blood-vessels, than the pleura or the white matter of the brain, when congestion or inflammation does not exist; but where vessels are easily detected by the naked eye in all of them, when these phenomena take place.* Dr. Kingston also argues for the vascularity of tubercles, and cites, as an analogous proof, the *supposed* non-vascularity of articular cartilage, which, he says, has now been proved to be supplied with blood-vessels.† In this, he may be said to overlook the ready development of vessels

* *Lugol's Lectures*, by M. M. Bennett and Guiet; *Medical Gazette*, September 24, 1841.

† *Medical Gazette*, November 26, 1841.

in textures normally corpuscular, or only endowed with cellular permeability. In opposition to these views, many pathologists, especially in this country, consider tubercles to be composed of inorganized matter deposited from the blood on the mucous surface of the air-cells, and, not unfrequently, in the parenchyma of the lungs. It also follows, that as no change can originate in the inorganized matter itself, so the solidified tubercle can only be affected through the agency of the parts around, or in contact with it. These latter opinions are founded, principally, on the anatomical researches of Dr. Carswell, and Dr. Watson adopts them to their full extent, while he agrees with Lugol, that the formation of tubercles is closely linked with the scrofulous diathesis.* While the miliary tubercles are considered by Andral, as the pulmonary vesicles rendered hard by chronic *inflammation*; others, following Dr. Carswell, continue to attribute them to a secretion from the blood, not of tubercular matter alone, but also of a portion of its albuminous fluid, forming a transparent matrix or cyst for the more solid deposit. Dr. Watts seems to hold the modified view of tubercles being of an intermediate nature between pus and coagulable lymph, first solidifying, then softening.† That tubercles are the pure result of inflammation is now rarely entertained; but the more modern phraseology is, that they are the result of a perversion of the ordinary process of nutrition; and that the existence of the scrofulous diathesis occasions that to be de-

* Lectures in *Medical Gazette*, vol. xxix.

† *Dublin Journal of Medical Science*, March, 1842.

posited as inorganizable albumen, which, in a sound state, would have taken on the form of organized fibrine.* Dr. Campbell, moreover, in his late *Observations,* infers, with some French physiologists, that the pulmonary capillaries are of smaller dimensions in individuals of strumous habits, than in those of a healthy constitution. This is the predisposition which arrests the imperfectly organized globules in the lungs—a deposition therefore takes place in the pulmonary capillaries, followed in process of time by a reaction, explosive of the disease. M. Louis, in his admirable article on Phthisis, in the *Dictionaire de Médecine,* lately published, takes a review of all the theories existing on this subject, and considers objectionable that of tubercle being the result of inflammation, or of being nothing but concreted pus, having its seat in the venous capillaries, according to Cruveilhier and Lallemand. He considers the semi-transparent granulation or miliary tubercle as the first degree, or the nucleus which is developed into the crude tubercle; and, on the whole, he seems inclined to attribute some vascular organization to these bodies. The article is a most valuable one, and deserves translation into our language.

Notwithstanding the continued hopeless fatality of tubercular phthisis in general, after all the progress that has lately been made into its *genesis* and the intimate analysis of its morbid products, still we may say, we are advancing in the more correct appreciation of those cases, in which a lamentable issue is to take place, through the means

* *Carpenter's Physiology,* p. 497.

of our improved stethoscopic diagnosis. The more perfect knowledge of the predisponent causes and the incipient condition of the disease is, by degrees, leading us to a more scientific application of preventive measures, and, especially, by correcting early aberrations in the nutritive organs. The use also of respirators and of artificial local atmospheres, as recommended by Mr. Jeffreys,* if a timely removal to an appropriate climate cannot be accomplished, are also thought more worthy of attention. It would also appear from Liebig's late investigations, that a diminished supply of oxygen from a warm and moist atmosphere, would tend to diminish the amount and severity of pulmonic disease.† Mr. Gilbert, in his lately published work,‡ while he considers, like several of his predecessors, the *fons et origo* of the disease to be owing to inorganizable matter being conveyed into the blood from a defective or perverted nutritive process, strongly insists on a judicious regime and diet in youth, especially where there is a phthisical diathesis in the parents. To detect the earliest invasion of the disease, which is the most difficult point in our stethoscopic diagnosis, he recommends M. Fournet's very discriminative attention to the respiratory murmurs, and especially to those of expiration, which are increased both in duration and intensity, while the inspiratory murmur is increased only in intensity, but diminished in duration.

* *Medical Gazette*, vol. xxx.

† *Liebig's Organic Chemistry of Physiology and Pathology*, p. 23.

‡ *Pulmonary Consumption; its Prevention and Cure, established on new views of the Pathology of the Disease*, London, 1842.

The occasional discovery of cicatrized cavities in the lungs, such as are related by M. Payan, of the Hotel Dieu of Aix,* and by Drs. Stokes and Graves,† has moreover stimulated some to continue the use of empirical remedies, even in the advanced stages. Among these, we have the *proto-iodide of iron* and the *ol. asphalti;* while, in the early periods, we have the pure alkalies highly recommended by Dr. Campbell,‡ and repeated emetics of *ipecacuanha* by Dr. Durant,§ after the old plan of Dr. Morton. We must not here forget the very elegant arsenical cigarrettoes, invented by M. Trousseau, which, in these days of *fumomania,* might be easily and effectually adopted, instead of glass inhalers or other stationary apparatus, which are seldom perfectly managed by delicate and nervous patients.

Some of our French brethren are not very sanguine, that the light of modern science will add much to the cure of phthisis; and M. Paris, Haute Saóne,‖ even says, that since the discovery of auscultation and percussion, the disease is in general more rapidly fatal. He attributes this to an early decided prognosis, whereby the patient is at once put upon a medicated diet, by which the blood becomes sooner impoverished; for he considers the very essence of the disease, to be a poverty of nutritious principles in the blood—that its character is chronic, and that its more irregular and rapid progress is owing, to the employment of an antiphlogistic

* *Revue Médicale,* November, 1841.
† *Dublin Journal,* January, 1842.
‡ *Op. citato.*
§ *Medical Gazette,* December 31, 1841.
‖ *Bulletin Général de Therapeutique,* September, 1841.

treatment, to a dietetic regimen, or to a milk and mucilaginous diet, producing an atony in the digestive organs, and also to the depression of the active moral sentiments. He also cites some cases where a generous diet and dissipation of time, with travelling, produced a cure or lengthened course of the complaint. I may here remark, that some late statistical inquiries have tended to stagger the popular, if not medical opinion, as to the greater prevalence of phthisis in some climates and among some classes of people, who were thought very obnoxious to the disease. A writer of a very elaborate article in the *London Medical Gazette* has endeavoured to show that, from statistical returns, "it is neither inequability of temperature, nor the frequency and magnitude of the variations in temperature to which a country may be subject, that have any effect in the production of phthisis;"* and Mr. Noble, before the statistical section of the last meeting of the British Association, has deduced some observations, in which some few others concurred, that the deaths from consumption, in the factory district of Manchester, were actually fewer in proportion to the deaths from all causes, than in the agricultural county of Essex, being as four to twenty-one in Essex, and three to nineteen in Manchester; and finally he showed, that a smaller rate of mortality from this disease, compared with the number of deaths from other causes, existed in the Manchester district, than was to be found in the rural parts of the country.

Of those somewhat rare but very interesting

* *Medical Gazette*, July 1, 1842.

diseases of the lungs, cancer, and cirrhosis, Dr. Stokes has given, in the *Dublin Journal* for May last, a very luminous account, with cases, and enters very fully into their pathology and diagnosis. A case of cirrhosis is also given by Dr. Green; and from the perusal of both details much interest and instruction may be derived.

Cardiac Diseases.— These are still attracting the renewed and diligent attention of pathologists and physicians; and there are none which have excited so much interest, and given rise to such modified opinions on some of their causes and phenomena, as these complaints. This arises, a good deal, from the different views which are entertained on some of the minor points of the action and sounds of the heart in a normal state. The pathology of this organ is founded so much on the laws of physics, that all researches into its morbid condition are sought to be explained on such principles; and the belief that we are always acting upon such a solid basis, in our analysis of its morbid states, makes us adhere with some pertinacity to our interpretations, however refined. The spirit of exact science forces us to interpret every morbid phenomenon of this organ, on these principles; and we often seem more willing to be pushed hard on a problem of this nature, than candidly to betake ourselves to the ground of Hippocratic symptomatology. Dr. Skoda, of Vienna,* has made considerable innovation on our commonly received notions about the sounds of the heart, as he had before done about the

* Report by Drs. Drysdale and Russel, *Edinburgh Medical and Surgical Journal*, January, 1842.

breath-sounds of the lungs. According to him, the first sound, or that of the systole, arises from the interruption of the stream of blood, by the shutting of the mitral and tricuspid valves, and chiefly depends on the *columnæ carneæ* and *chordæ tendineæ* being thrown into a state of vibration, by the sudden closure of these valves from the blood in the ventricles. The second normal sound is held by him to be produced by the shock of the column of blood against the semi-lunar valves, which is communicated to the coats of the aorta, and often to the carotid and subclavian arteries. He denies that any abnormal sound is produced without organic change, such as by spasm, as conceived by Laennec, or by plethora, as stated by Andral. He also never met with any abnormal sounds arising either from bleeding, or general anæmia, as is alleged by several; and says, the abnormal sounds in chlorosis are not found in the heart, but only in the arteries of the neck. He, moreover, considers all subdivisions of abnormal sounds to be quite superfluous, and of no diagnostic value; that the rubbing sound of the pericardium may imitate any sound produced within the heart, with the exception of the whistling sound; and that every variety of the rubbing sound may occur within the heart. If the motions of the heart are weak, no rubbing sound may be produced, when the pericardium is covered with a thick and rough false membrane. He reckons all the different bellows-sounds to arise from impediments to the free current of the blood through the several orifices, affected either with stricture, fibrinous spots, vegetations, or lesions of the valves, and their seats are to be

ascertained by stethoscoping the several localities of the organ. These and some other alleged corrections by the Vienna Professor have not received, as may be supposed, the assent of the majority of pathologists in this country; and Dr. C. B. Williams has critically adverted to them, and endeavoured to show, where Skoda has been mistaken in some of his conclusions, especially in overlooking, that loudness of sounds depends not only on the nearness of their source, but also on the conducting power of the parts which intervene; and also that sounds, much more generally, originate in the heart than in the vibratory walls of the arteries. I need not say how far Skoda differs from Drs. Latham and Watson, on the rubbing or *to and fro* sounds of the inflamed pericardium.

M. Bouillaud still persists in deducing his diagnosis of diseases of the heart from his theory of the two sounds; and, in a lengthened and very interesting case, lately published in the *Gazette des Hospitaux*, seems to have diagnosticated very correctly, as to the lesions in the right auriculo-ventricular orifice—triumphantly exclaiming, "*N'est ce point ici le cas, ou jamais, de répéter cette expression, qui amene sur bien des levres un sourire passablement ironique, que la médecine tend tous les jours, de plus en plus à devenir une science exacte.*" It is to be regretted there exists so much discrepancy among our first pathologists on the many morbid phenomena of the heart, as well as other organs; for while M. Bouillaud and some others speak of the majority of organic cardiac affections, as attending or following

acute rheumatism, M. Chomel found only six cases out of eighty-six of rheumatism affected with heart complaints, before the attack upon the joints, and four only after the rheumatism subsided. M. Chomel heard only the *bruit de souffle* in twenty-nine out of the eighty-six cases. He also met with this sound in five of pneumonia, and, in one of the fatal cases, not the slightest morbid change was observed in the heart. In three cases of small pox, in one of typhoid fever, in two of bronchitis, and in several cases of acute metritis, this sound was distinctly heard by him, and no morbid change in the heart supervened. From these observations he concludes, that the *bruit* is far from being constant in cardiac rheumatism, and occurs frequently in other diseases.* To add to our caution, if not to our scepticism, as to some of the presumed correctness of the physical signs on which many depend, Dr. Graves considers, that the diagnosis of the diseases of the heart has not yet been brought to the alleged degree of perfection; and that numerous observations and dissections have convinced him, that there is no distinguishing diseases of the auriculo-ventricular from those of the semi-lunar valves, and that the right side is often indicative of the left. Indeed, the physical symptoms not only are unable to point out the disease, but are insufficient to point out its very existence. Even excessive disease of the mitral valves cannot always be distinguished from aortic roughness, in the present state of the science. He, moreover, pretends to give no opinion about the

* *Gazette des Hospitaux*, 1841.

cause of *fremissement* or *bruit* in the arteries of the nervous and debilitated.* Dr. Caniere, of Strasbourg, at least, with more therapeutic confidence, lays down the *bruit de diable,* wherever detected in the large arterial trunks, as a certain test for the exhibition of ferruginous medicines in all complaints, whether chlorotic or not. He has detected this sound in cases of hemicrania, gastralgia, and other neuralgiæ, and thence successfully exhibited iron medicines.† The ingenious application of this test may thus be made subservient, for the most useful and ready purposes in therapeutics, as it professes to be of that precise and isolated character, that we have only to have recourse to the weapon of steel, when we can detect this *devil*-sound in the circulation.

Our journals are, from time to time, making us acquainted with many interesting cases of cardiac disease, which, at times, are exceedingly instructive if not amusing, from the acuteness or errors of the diagnosis, which the revelations of *autopsia* as often correct as they confirm. Among these, mention may be made, as the product of the year, of seven cases of valvular diseases, chiefly of the left side of the heart, by Mr. Thomas Moore ;‡ an interesting case of hypertrophy of the right, and atrophy of the left side, by Mr. Hindle ;§ a case of cancer of the sigmoid valves of the aorta, by Mons. Payan ;‖ and some cases with regurgitation through the mitral

* *Dublin Medical Journal,* May, 1842.

† *Bulletin de Therapeutique* ; from *Johnson's Review,* October, 1841.

‡ *Lancet,* September, 1841.

§ *Provincial Medical Journal,* December 4, 1841.

‖ *Ibid,* January, 8, 1842 ; from *Revue Médicale.*

valve, by Dr. Budd.* This latter named physician does not altogether coincide with the absolute view of Dr. Blakiston, as to the constant connection of imperfect closure of the tricuspid valves with all cases of dropsy, resulting from lesions of the heart, (which was noticed by my predecessor,) though Dr. Budd's two cases of aortic and tricuspid regurgitation rather tend to confirm Dr. Blakiston's proposition. Dr. Budd, also, in noticing Mr. King's idea, that the tricuspid valves allowing regurgitation serves a good purpose, from acting as a safety-valve, in cases of hypertrophic dilatation of the right ventricle, says, that if Dr. Blakiston's view be correct, this safety-valve advantage may, like most good things, be alloyed with some evil.†

The desponding sentiments of Dr. Watson, expressed in his highly valuable lectures,‡ as to the perfect recovery from pericardiac inflammation and effusion in rheumatism, are not adopted by the majority of physicians; and Dr. Burridge ventures to contrast the more hopeful opinions of the late Dr. Hope and himself on this subject.§ Dr. Bulckens and M. Simon, of Brussels, have lately stated some very pertinent remarks‖ on the *bruit de souffle*, and Dr. Graves notices a musical tone in pericarditis, as being quite new to observers.¶

Improved as the pathology of the heart has become, and refined as the diagnosis of its various

* *Medical Gazette*, January 7, 1842.
† *Ibid*, December 21, 1841; January 21, 1842.
‡ Lectures in *Medical Gazette*, 1842.
§ *Medical Gazette*, February 18, 1842.
‖ *Archives de la Médecine Belge*, January, 1842.
¶ *Dublin Journal*, May, 1842.

lesions have been alleged to be, so as almost to lead the inexperienced to suppose that nearly every physical secret of its morbid, as well as of its healthy workings, has become revealed, still it is a subject of continued regret, that our therapeutic means of cure or alleviation are not correspondingly improved, if our confidence in them be not rather discouraged—somewhat to the disparagement of our professional abilities, for the public, who are patients, or have an interest in those that are, care much more for cure and comfort than for the advancement of science. As the majority of all diseases of the heart and its membranes are considered to affect its mechanical structure and the dynamics of the vascular system, so our most effectual remedies still consist in diminishing or regulating the force and volume of the circulation; and beyond the means that have been for some years in acknowledged use, I do not find, that the progress of medicine has anything new to offer during the last year, worthy of your passing notice on this head.

Liver.—The pathology of the liver is likely to be much improved from our lately acquired knowledge of its minute structure, as developed by Mr. Kiernan, and by Mr. Bowman, on the organization of the fatty deposits, conjoined with the intimate chemical researches of M. Liebig on the biliary fluid, as being the great secretory outlet of carbon from the blood, and not altogether excrementitious; for he considers the bile to be very frequently absorbed from the upper intestines, and to be always more or less altered in the solid excrements, and even to be sometimes nearly wanting in them,

as in the horse.* Dr. Babington has stated a rare case of enormously extended gall-bladder, which was found, after death, to be filled with two large wash-hand basins full of a reddish, ropy, and opaque fluid.†

Cirrhosis of the liver is also becoming more understood, as analogous, if not identical with the structural degeneration of the kidney, and the similar affections of the lungs, as already noticed. In forty-two cases of cirrhosis of the liver, Becquerel found Bright's disease to exist in fifteen of them, and in these cases anasarca preceded the ascites. The anatomical nature of the two degenerations is very similar; for, according to Mons. Becquerel, the fibro-albuminous matter of the blood is supposed to be deposited by interstitial infiltration in the centre of the hepatic lobules, and the yellow substance of the liver thus becoming hypertrophied, causes compression, and, eventually, atrophy of a great part of the red or interlobular substance.‡

Kidneys.—Of all the diseases of the internal organs there are none which have, of late years, excited greater interest and research than those of the kidneys—whether we regard the pathology of their texture, or the nature of their altered or morbid secretions. The subject is far from being exhausted; and the anatomical change of structure, which either gives rise to, or accompanies what is called Bright's disease, or granular degeneration, is yet a mooted point; while the relative condition

* *Liebig, ut supra,* p. 63

† *Guy's Hospital Reports,* April, 1842.

‡ *British and Foreign Medical Review,* October, 1841; from *Archiv. General.*

of the albuminous urine with the more or less disappearance of urea in that fluid, and its presence in the blood, has engaged the attention of several chemical pathologists, as well as given rise to a little recent controversy.

Among the authors who have of late treated on these affections, the indefatigable and acute Rayer is the principal. He seems particularly to distinguish between nephritis with albuminous urine and the granular degeneration. He generally observed the specific gravity of the serum of the blood to be inversely, as the urine was charged with albumen. He has detected no urea in the blood in the early stages of either disease. In chronic albuminous nephritis, the action of heat and nitric acid on the urine at once produces a solid albuminous coagulum. He has also observed, that œdema of the lower extremities, connected with renal disease, does not subside by rest in the horizontal posture, as when the disease depends on disease of the heart. In addition to what had been previously observed by Nysten, Guibert, and Dr. Barlow, M. J. F. Simon says,* he never failed to find urea in the blood of those, who have died of granular degeneration in the kidneys, but he also found it in healthy blood of the calf in small quantities. Rayer does not agree with Drs. Wells, Blackall, or Christison, in thinking mercury an exciting cause of the disease. He also differs from Dr. Bright, who states, that in sixty-five cases out of 100 of granular degeneration of the kidneys, the heart was more or less diseased; for he says, that in not more than $\frac{1}{5}$ under his notice

* *Müller's Archives, heft* v., 1841.

were there any appreciable alterations in the heart. He distinguishes between simple nephritis, which affects the pelvis and calices, and albuminous nephritis, which is confined to the cortical parts.* Dr. Williamson has detailed eighteen cases† wherein death took place from various diseases, and in all which albuminous urine was passed during their previous illness, without any granular degeneration being found in the kidneys. His conclusions are, that albuminous urine may result from a morbid or abnormal fluidity of the blood itself, and is disposed to place more dependence on the low specific gravity, than on albumen in the urine, as being characteristic of the granular kidney. Dr. Todd thinks the blood is poisoned with the urea, which is contained in it in those cases.‡ After all, the question appears yet undetermined, whether the intimate structure in the cortical substance—or the Malpighian bodies, is the seat of the primitive lesion giving rise to this state of the urine, or whether the initial cause is in the blood itself, which infarcts the uriniferous cœca or capsules of the said bodies, with its unchanged superfluity of albumen. The sudden appearance of coagulable urine in cases of scarlatinal dropsy would seem to favour the latter opinion. Dr. Copeland notices, after death, from inflammation of the kidney, the vascular or cortical tissue to present a congeries of red points, distinct from the orifices of the divided vessels—these points being disposed in lines or

* *Johnson's Medico Chirurgical Review.*

† *Edinburgh Medical Journal,* October, 1841.

‡ *Lancet,* September 28, 1841.

series, very rarely in groups, and are the glandules of Malpighi highly injected.* He agrees with Rayer and some others, that dropsy, unless it be in the more acute states of it, or from sudden effusions of serum, does not appear, as a consequence so frequently of inflammation of the kidney, as of the more chronic and peculiar form of the disease first noticed by Dr. Bright. This latter named gentleman has lately promised, that he and Mr. Toynbee would soon bring forward their microscopic investigations on the changes, that take place in the kidney, from the *point de depart* in the healthy state through all the stages of the disease, which he places entirely in the *corpora Malpighiana*.† This promise seems to have been prompted by Mr. Robinson having published his Memoir on the same subject, at the beginning of the year, by which, we hope, the laurels destined for the talented physician may not have been anticipated. Be that as it may, the laudable desire of timely sharing in professional fame seems also to have roused the proof sheets of Dr. Copeland's unfinished part of the Article on the kidneys, into the premature light of day; and he claims by anticipation in the *Medical Gazette*,‡ at least, a contemporary participation in the honours of science, for his researches into the arcana of renal disease. Which of the works of these talented pathologists will first be delivered from the bonds of the press, time will show; but this legitimate rivalry, at least,

* *Dictionary of Practical Medicine*, Art. Kidneys, p. 633.

† *Medical Gazette*, January 28, 1842.

‡ *Ibid*, February 4, 1842.

shows the great zeal with which the subject is prosecuted, and which, I believe, has enlisted no less ardent investigators in the pursuit. Among other explorers in this field, is Mr. Reynolds, who notices a case of the total absence of the Malpighian bodies, and where injections thrown in by the *ureter* filled the *tubuli* and veins; from which he was led to suppose that these Malpighian bodies are the primary seat of the disease, and that the free communication between the *tubuli* and veins might be sufficient to account for the presence of albumen in the urine, and urea in the blood.* This is a short cut certainly, and we shall wait to see if the road will bear travelling hereafter.

As to the mode in which urea exists in the urine, M. Lecanu differs from M. M. Cap and Henry, who have repeated their experiments after the doubts thrown upon them by M. Lecanu. They still adhere to their former statement, that this azotic ingredient is held in solution, or is in combination with lactic acid, also, perhaps, with the phosphoric acid.† As to the effect of benzoic acid on uric acid in converting it into hippuric acid, so ingeniously discovered, and promising so much usefulness in cases of chronic gout, by Mr. Ure, it appears that it is not the uric but the benzoic acid that is so transformed; and Keller considers that Mr. Ure has been too hasty in recommending benzoic acid, as a remedy for the gouty and calculous concretions of uric acid.‡ In corroboration,

* *Ibid*, February 11, 1842.

† *Archives Gènèrales de Médecine.*

‡ *Liebig's Organic Chemistry of Physiology and Pathology*, p. 328.

however, of the very salutary effects of benzoic acid in gouty complaints and affections of the bladder, Dr. Walker, of Huddersfield, gives four cases, without attempting to explain its chemical action on the fluids, where the acid was very beneficial.*

Since we are noticing some of the abnormal conditions of the urine, the subject of *kiestein*, or that inorganic pellicle that forms on the surface of urine passed by pregnant women, merits a few remarks, as it has excited a little difference of opinion among observers, as to its being a test of pregnancy. It appears to have been noticed by Nauche, in July, 1833, then by Eguisier, in 1839, and Dr. G. Bird described it in 1840, and says he had met with it in the end of the second month, and always in the urine of pregnant women, with the exception of some labouring under inflammatory complaints.† Dr. Turchetti, however, found the pellicle of *kiestein* in the urine of non-pregnant, as in that of those pregnant; he says that it exists also in the urine of those under inflammatory diseases, in those of good health, and both before and after puberty, and that it has the smell of casein, and never in any state exists in the urine of men.‡

Dr. Cenni again found the pellicle not constant and never to be completely formed before the fourth day, whether the urine is kept cold or hot. He also states, it has been found in the urine of men, and has rarely the odour of cheese. In corroboration,

* *Provincial Medical Journal*, February, 1842.

† *Guy's Hospital Reports*, 1840.

‡ *L'Examinateur Médicale*, October, 1841.

however, of Dr. Bird's statement, Mr. Letheby advances his own very amply and carefully conducted experiments, from which he found unquestionable evidence of *kiestein* in forty-eight out of fifty cases. He says it has not the odour of cheese, but of raw beef beginning to putrefy.* Messrs. Pherters and Perry, of Philadelphia, further confirm its very frequent existence in pregnancy—having found it in twenty-four out of twenty-seven pregnant women; and further, they could not detect it in the urine of twenty-seven unimpregnated women.† The greasy pellicle in pregnant women is also noticed by Lubanski and M. Donné, the latter of whom, besides, states, that the precipitate of phosphate of lime is much less in pregnancy than in the normal state.‡ This statement leads to a very attractive and logical theory; as it is easy to suppose that the calcareous salts are diminished in the mother's urine, since the fœtus requires a supply of them for its bones, after the 15th to the 30th day from conception. The last recorded remarks, we have on this subject, are from Dr. Stark, who has found the pellicle quite distinct in six weeks after conception, and in the third month very plentiful. He knows of no disease in which urine, with the chemical peculiarities which he details, will furnish a pellicle like *kiestein*. He holds it to be neither milk nor caseum, but a peculiar, matter *sui generis*, forming, in some measure, a connecting link between the albuminous

* *Medical Gazette*, December, 1841.

† *British and Foreign Medical Review*, October, 1841.

‡ *Annales d' Obsetritique des Maladies des enfans et des femmes*, Jan. 1842.

and gelatinous principles. He hence calls it *gravidine*, from *gravida*, big with young,* which seems a better term than *kiestein*—gravel stone. The importance of this test of pregnancy may possibly be of some consideration in medico-legal cases, when conjoined with others more obvious; but, of itself, I am afraid it cannot be confided in, more than in the *water-castings* of some of our rural iatrochemists on the same subject, when the characters of deceived and *quasi* innocent virgins are at stake.

I do not know, that anything particularly new has been laid before the profession on the very interesting disease, diabetes, since the last edition of Dr. Prout's work on urinary diseases, beyond confirming the opinions that have been for some time entertained, as to the chemical changes that obtain in the *primæ viæ*, the blood, and the urine, and that the saccharine diathesis must be met by an azotised diet, even to the substitution of bread deprived of so much fecula, as to have only what will ensure slight fermentation. To unravel some of the chemical etiology of this disease, Dr. Edward Stanley, from the physiological and chemical analysis of previous authors, and his own experience, considers the disease dependent on an accumulation of carbon and oxygen in the system, with a deficiency of nitrogen, owing either to the quality of the ingesta, the atmosphere, or to the morbid condition of one or several organs destined to eliminate carbon, with or without oxygen, such as, the lungs, liver, and, in a majority of cases, the skin—those principles being mostly directed to the kidneys.†

* *Edinburgh Medical and Surgical Journal*, January, 1842.

† *Medical Gazette*, September 4, 1841.

What we, however, want, is to verify the *locus in quo* the abnormal saccharine contamination originates—whether in the stomach, the mucous apparatus of the first passages, the chyliferous canals, or in the laboratory of the blood itself. Mr. Lambert has successfully treated a case of this disease by Dover's powder, hyd. c. creta, and opium, but in this and other cases he had found no benefit from the sesquicarbonate of ammonia, as lately recommended.* M. Bouchardat, in his paper read before the Academy of Sciences last November, has principally insisted on thick flannel clothing, carbonate of ammonia, and the gluten bread—which treatment was followed by an evident amendment in two cases, and with a cure in other two. He did not find that the ammonia passed off by the urine, which continued acid in them all.†

The important discovery of oxalate of lime in the urine has been very lately made by Dr. Bird, who declares, from his own experience, that the salt is of more frequent occurrence in urine than the earthy phosphates. He found it in one half of the cases examined, but considers it not to be produced from saccharine matter, but from the decomposition of urea. This discovery is of some importance, as this salt has never been previously detected, even where the mulberry calculus was known to exist.‡

Saliva.—The chemical nature of the salivary fluids has received considerable elucidation from a series of experimental observations, by Dr. Davidson,

* *Medical Gazette,* October 4, 1841.

† *Provincial Medical Journal,* December 4, 1841.

‡ *Medical Gazette,* July 23, 1842.

the result of which is, that the presence of sulphocyanogen, as tested by the sesquichloride of iron, is not to be considered as an infallible criterion of good health, yet its absence frequently ought to excite inquiry upon this point. He found it often absent in patients labouring under a variety of diseases, especially in febrile ones, and invariably in salivation from mercury, though its absence, when taken separately, is no proof of the action of mercury on the system.* To account for the varying nature of the fluids of the mouth, as to their alkaline and acidulous properties, it has been ascertained that, the mucous fluids from the follicles of the buccal membrane, are acid, but that the real saliva from the parotid and sublingual glands, which are only poured out during mastication, are alkaline, and that mercury rather increases the flow of the mucous fluid than that from these glands.† In connection with salivation, two very rare and interesting cases of the contagious effects of mercurial salivation are related by Mr. Walker.‡ The possible occurrence of such results should be held in view in medico-legal cases, and at all times, to save the credit of the practitioner. Females were the persons secondarily affected, and no doubt from inhaling the mercurial halitus of the objects of their nursing cares.

Pyrosis.—With respect to the chemical nature of pyrosis, or water-brash and gastrodynia, Dr. Bird has entered into a very elaborate and scientific

* *Medical Gazette*, Nov. 26, 1841.

† *Ibid*, January 21, 1842.

‡ *Provincial Medical Journal*, February 5, 1842.

investigation of the subject,* and the profession is besides much indebted for the application of his time and acquirements to several relative subjects, hitherto unknown or overlooked. He combats the opinions of Dr. West,† that pyrosis is a disease of the terminal serous exhalants, or that stomach gleet is one of the follicular glands. Dr. B. denies, as many others do, the existence of serous vessels at all, and supposes, that the distinction between the two ejected fluids depends on their exciting causes, and on the amount of local and constitutional disturbance present. He is, further, not inclined to agree with Dr. Burne, that the fluid is furnished by the salivary glands and muciparous follicles of the mouth.‡ Dr. Bird has also corrected, in many cases, the very statements of the patients as to the acidity of the fluids ejected, by testing them, immediately after being voided, by litmus paper, without the least indication of acidity; on the contrary, they were found alkaline, when the patients complained of their teeth being set on edge, and of the fluid having occasioned a burning sensation in the stomach and pharynx. In all cases the fluid was found to be somewhat acid, when ejected during digestion, and very seldom so when the stomach was empty. In scirrhus of the pylorus, he also found, that the hydrochloric acid was gradually replaced by the organic acids in the ejected fluids, as the disease proceeded

* *Medical Gazette*, pp. 397, 426, 1842.

† *Treatise on Pyrosis Idiopathica*, 1841.

‡ Dr. Burne on *Habitual Constipation*.

Fever.—The ever occurring importance of idiopathic fever is still claiming the inquisitive study of the medical practitioner; and amidst the several theories that come like shadows to depart, there remains enough of mystery and practical interest, for to stimulate him to re-investigate its pathology, and to improve his therapeutic measures. In the prevailing current of theory, the days of solidism have nearly passed away, while the *primum mobile* of nervous lesion is holding on a feeble existence, and struggling hard with the returning tide of a humoral pathology. Even the birth-place and strong-hold of the localized doctrine of fever, as propounded by Broussais, is threatened to be overwhelmed by the vito-chemical *essentiality* of the blood and circulating fluids, so that the reign of the humoral pathology seems about to be restored—but with this important difference, that the initial morbidity consists, not in the fluids being too hot or too cold, too thin or too inspissated, but in their abnormal organic or chemical constituents, as ascertained by analysis and the microscope. It is curious to see that, from the great chemical school of Giessen, such a mechanical notion of fever has just issued through the press, as that *fever* is caused by "a greater amount of force being generated, than is required for the production of the normal motions, as is seen in an acceleration of all or some of the involuntary motions, as well as in a higher temperature;" and that "a *febrile paroxysm* takes place, when a great excess of force is produced by change of matter, the force, since it can only be consumed by motion, extends itself to

the apparatus of voluntary motion."* The *Archeus* of Van Helmont, or the *Anima* of Stahl, is perhaps, equally intelligible.

The chief question yet in abeyance in this country, besides that of contagion, as applied to fever, is the identity or not of what is called typhus and typhoid fever; and whether the primitive lesion takes place in the nervous or sanguineous system of the whole body, or is a localized one in the brain, or in the mucous apparatus of the smaller intestines. In France, the contest seems now to be between its intestinal origin and the lesion or depravity of the blood; while among our American brethren, the neurologic and *essential* doctrine seems yet in the most general vogue. I may here observe, that Dr. Forry, of New York, scarcely does justice in saying, that, probably, not one in fifty of British practitioners entertained any doubt of the infectious nature of continued fever, comprising synocha, synochus, and typhus.† The opinion seems to gain ground that there is a specific difference between typhus and typhoid fever or dothinenterite; and that the one is not the mild or protracted variety of the other, as many circumstances in their history and symptoms would at first induce the belief, and is often, by force of argument, still insisted on. A late writer in the *Medico-Chirurgical Review*‡ considers typhus contagious, while the other is not ordinarily so, but a true dothinenterite—affecting the intestinal mucous

* *Liebig, op. cit.* p. 256.

† *American Journal of Medical Scien e*, October, 1841.

‡ For October, 1841.

follicles, and having its primary cause in depravation of the blood, from poor, defective, and malarious ingesta. Typhus is found by him to prevail more in cold weather, while the typhoid prevails in autumn—typhus most in towns, the other in the country; and I think these differently prevailing localities of the two fevers have been noticed by many observers, and they comport with my own knowledge. A very able article on the identity of the two fevers, in the *British and Foreign Medical Review* for last October, holds they are the same in species, but of different varieties, but does not assent to what is called the essential nature of either affections. Mr. Bell is also decidedly opposed to their *essentiality*, but as vehemently argues for their identity,* in opposition to Dr. Stewart and M. Lombard. One characteristic difference remarked by those advocating their non-identity, is their mean duration—the typhus being less than that of the typhoid; but the greater duration of the latter disease has served the identifiers to explain the lesions found in the Peyerian and other glands, from the mere lapse of time allowing the progress of such lesions to become more perfect. It does agree, certainly, with the observations of all writers, that the more lengthened the fever has been before death, the more of these lesions are found; and this observation is very specially confirmed by the very able and valuable report of our associate, Mr. Peacock, in the last volume of our *Transactions*, on the cases at the Chester General Infirmary—a report which, it is much to be regretted, is not more frequently

* *Medical Gazette*, March 4, 1842.

imitated, in its character and production, by the medical officers of our other public institutions.

A peculiar morbid product has been lately said* to be discovered by Professor Rokitansky, of Vienna, in the mucous follicles of the ileum, colon, bronchi, and the lymphatic glands, similar to cancerous degeneration. This deposit is said to be preceded by a violent congestion of the vessels of the part affected; at first it is a greyish marrow-like substance, then a scurf or crust, which falls off, or it degenerates into loose vascular texture—a source of profuse hæmorrhage, or it may become a typhous ulcer. The Professor, besides, considers that in the exanthematous typhus, the pyrexial process runs its course in the blood without localizing itself; when it does, it is the typhoid or dothinenterite. This substance may, after all, be neither more nor less than the follicular secretions, detected at various stages of their elimination and degeneration; and I fear the general contamination is little else than a mere figment. From the typhus that prevailed at Rheims in 1833 and 1840, M. Landouzy concludes that the jail typhus and the typhoid fever too nearly resemble each other not to be regarded as analogous, while their differences are too numerous to constitute an identity.† Dr. Kalt, of Bonn, in highly recommending the *nit. argent,* in doses of half a grain to half an ounce of distilled water, every hour, and also by injection, in abdominal typhus, declares the first cause of this disease to consist in

* Dr. Russel; *Medico-Chirurgical Society,* Edinburgh, Dec. 1841.

† *Archives Générales de Médecine,* January and March, 1842; from *British and Foreign Medical Review,* July, 1842.

the disproportion of the electricities of the skin and intestinal mucous membrane, which are opposed to each other in a polar manner.* Some of our late writers, as Dr. Bostock, still adhere to practical classification, in considering typhus as asthenic, cephalic, gastric, or enteritic.† I feel, however, it would be an ill-timed trespass upon your patience, if I were to detain this Association any longer on this wide subject, after the very recent publication of M. Louis's second edition of his able and analytical work on "*La Fiévre Typhoide*"—the comprehensive article on the pathology of fever in the *British and Foreign Medical Review* for October last, and, not to forget, the highly meritorious work to which this Association has set their seal of pre-eminence at the Southampton meeting.

Though intermittent fever has nearly disappeared in this country, yet in the United States it still prevails in many of the old settlements, and in the newly cleared lands, it often returns in quite an epidemic form—giving practitioners in that country much acquaintance with it, under all its phases. The sulphate of quinine is almost their sole remedy, but they give it in much larger doses than is either thought suitable or safe in this country; for while two or three grains, every six hours, are here considered sufficient in the intervals of the paroxysms,‡ our American brethren generally commence with five grains, and Dr. Flint, of Buffalo,§ has increased the doses, until twenty, thirty, and, in some cases,

* *Archives de la Médecine Belge*, March, 1842.

† *Medical Gazette*, January 21, 1842.

‡ Dr. Watson; *Medical Gazette*, July 16, 1841.

§ *American Journal of Medical Science*, October, 1841.

forty grains were administered in half an hour. His usual course is to prescribe eight, ten, or fifteen grains; and if no unpleasant results follow, to repeat it in twenty to sixty minutes. He thinks the existence of even a well-marked phlogosis of any organ, except that of the stomach itself, to be really not a sufficient obstacle to the administration of the remedy. If any local affection should arise, he would rather simultaneously deplete, than fail in arresting the chain of intermittence, which he considers ultimately more dangerous. His cases are successful; and I believe Dr. Elliotson has also given very large doses of the quinine in this complaint with benefit. M. Boudin prefers, from his practical success, the preparations of arsenic to quinine, in the marsh and intermittent fevers of warm climates.*

Though yellow fever has ever been a complete alien to the British catalogue of diseases, yet it must be interesting to every medical inquirer, how this *febris febrium* behaves, from time to time, in its indigenous countries. Dr. Dupré has lately observed it in a very notorious locality, at Key West, in a great number of instances, from which he concludes, that in every case it is an inflammatory disease, becoming putrid as it advances, and that an antiphlogistic treatment should be rigorously resorted to. Besides a full bleeding, he generally gave olive or almond oil to evacuate and keep open the bowels—which oils he found to keep down the irritability of the stomach and intestinal canal, which is above all things to be looked to in this disease. He considers the disease not primarily contagious, but in every

* *Traite des Fievres Intermittents, &c., par* M. Boudin, 1842.

instance clearly epidemic. He does not concur with Dr. Stevens's views relative to the chemical change, which the blood is alleged to undergo previous to the disease; nor does he agree with Dr. Bancroft, that it arises from marsh miasmata.* The nature and origin of the disease, as described by Dr. Duprè, must be acknowledged, I think, by all who have witnessed its prevalence, and my humble testimony in former years can confirm the efficacy of venesection practised, during the first twenty-four or thirty-six hours, even from 100 to 120 ounces, in giving quick and permanent relief, if it did not cut short the fever altogether.

The medical topography of Western Africa, especially in relation to the late endemic scourges of its several fevers, has received much attention and enlightened description from the pen of Dr. Burton, whose articles on the above subjects are well worthy of perusal.† He mentions very little about the nature of the malarious cause, only he has known the disease to occur in many differently situated places on the coast, but never far from rivers or bays. As to the chemical means of prevention, lately adverted to and recommended by Professor Daniel;‡ it may be that the upper sheathing of ships is more rapidly corroded in the harbours and rivers of warm countries, where animal and vegetable decomposition is continually going on, and that the very fetid and unpleasant vapours emanating from the same places and the neighbouring marshes

* *American Journal of Medical Science*, October, 1841.

† *Provincial Medical Journal*, January and February, 1842.

‡ *Medical Gazette*, July and August, 1841.

contain a proportion of the sulphuretted hydrogen gas, which, if diffused in the atmosphere to the extent of $\frac{1}{1,500}$ part, or equal to the normal quantity of carbonic acid in the air, is said to be fatal to small animals—may be received as facts that have often been observed, yet that these intertropical fevers are due to the agency of this gas upon the human body, is not so satisfactorily made out. We often find and hear of sulphuretted hydrogen gas being frequently inhaled, or drank dissolved in many mineral waters, and even of persons brought by accident into an asphyxiated state by it; but I know of no instance of anything like a type of continued fever supervening. I therefore think we are only warranted in saying, that, in the etiology of these fevers, this gas is but a resting place for a little to the mind; and it is to be feared from the experience of all on the coast, as well as from our late calamitous expedition up the Niger, that with all our chlorinated antidotes, there is much left to be investigated about these dreadful scourges of European life in these quarters of the world. The recent experiments of Magendie, if they were better verified by himself and others, would seem the more direct and precise in discovering the chemical and physiological nature of marsh miasm. A quantity of the suspected atmosphere being condensed, according to him, a considerable precipitate of animal and vegetable matter was obtained, which ran into putrefaction with great rapidity. This being injected into the veins of animals, produced all the symptoms of yellow fever, and often death, while softenings, petechial extravasations, and great fluidity of

the blood were found.* If this malarious demon can thus be made to reveal itself, there are some reasons to hope that the chemist might discover its hidden power; and we might further presume that it would soon be exorcised at the school of Giessen. M. Liebig ascribes the fearful effects of sulphuretted hydrogen and of prussic acid, when inhaled, to their well-known action on the iron in the blood, when alkalies are present; and as free alkali is never absent in the blood, the phenomena of motion, by the action of these poisons, may be put a stop to in a few minutes.†

Plague.—The question of the contagious or non-contagious character of the plague is of such vast importance to determine, in a political and commercial, as well as in a philosophical view, that the mention of a circumstance favourable to the non-contagionist may not be out of place at this part of our address. It is the reception of men, affected with all the evident symptoms of the disease, on board one of our ships of war, on the coast of Syria; and though they were attended by nurses exclusively appropriated to them, neither one of these, nor any person on board, was seized with the least symptoms of the plague.‡

Morbid alterations of the Blood.—In concluding his report of the researches of MM. Andral and Gavarret on the subject, M. Monneret has very judiciously remarked, that from these investigations, it is not permitted for us to associate

* *American Journal of Science*, July, 1841.

† *Liebig, op. cit.*, pp. 274-275.

‡ *Medico-Chirurgical Review*, October, 1841.

typhoid fever with the phlegmasiæ, so different are the characters of the blood in the two diseases. Without affirming that the alteration in the blood is the *veritàble point de depàrt*, it may be asserted, he says, that the lesion of the blood is an element in the disease, much prior to that of the plates of Peyer, which is the startling point of Broussais and his followers. The study of the alterations of the blood shows evidently that there is something anterior to these intestinal lesions, and that the blood is altered in its composition. But again, is this alteration the cause of typhus? M. Monneret thinks not; and he is convinced that we have not yet reached the *dernier mot* of this disease, and perhaps never will.* These valuable researches of MM. Andral and Gavarret have not, however, been allowed to pass current altogether by M. Hatin, who states that the fibrinous clot of blood is no certain index of the inflammatory state, for the fibrine and the buffy coat are the same, the latter of which he calls *hæmaleucine*. He says the normal proportion of fibrine in human blood is six in 1000 parts; but after feeding, it may be double or treble that proportion. To show that this increase may be quite physiological, he instances its increase in healthy pregnancy, and abjures the buffy coat as a constant sign of inflammation.† No doubt there is much truth in these observations of M. Hatin, but this is not the place to endeavour to reconcile them with the observations of others, or with practical therapeutics. Dr. Buchanan has detailed a very

* *Gazette Médicale de Paris*, 1841.

† *Ibidem*, September, 1841.

ready and perfect mode of separating the fibrine from the serum of the blood and every particle of colouring matter—which mode may be of use in many analyses of the blood. It is done by filtration.* M. Liebig says, it cannot be doubtful that the function ascribed to the blood-globules may be fully explained, if, in a morbid state of the body, we shall discover a change in their form, structure, or chemical character—a change which must be recognizable by appropriate agents. He also conceives that blood-letting acts by diminishing the number of the carriers of oxygen (the globules) and by this means diminishes the action of the oxygen in the blood on the diseased part, so far that the vital force of the latter overcomes in a greater or less degree the chemical action; and if this be done without arresting the functions of the other organs, then restoration to health is certain.† I can only say—*se non è vero, é ben trovato.*

Diathesis.—Those dispositions inherent in the body, and which in medical language are called diatheses, have, from the most ancient times, attracted the renewed study of the pathologist, especially since the term diathesis has as yet conveyed nothing satisfactory to the mind, that looks for analysis and precision. In the history of this almost undefinable entity, we find that, like the chameleon, it has taken its hue from the reigning medical doctrine of the day whether this were humoral, iatro-chemical, solidism, or vitalism; and at this time there seems some probability, that it is about to undergo a renewed

* *Report of the British Association*, 1840.

† *Liebig, op. cit.* p. 259.

impression from the current cycle of these new modified doctrines. M. Jean Paul Tessier has lately entered upon a long critical enquiry into the purulent diathesis, and examined the opinions of Chomel, Velpeau, Dance, and Cruveilhier, upon the origin and deposition of pus in different parts of the body. He shows that it cannot be an infection as Chomel alleges, nor a chemical aggregation according to Velpeau, nor a mechanical metastasis with Dance; and he objects to Cruveilhier's theory, that these purulent deposits are owing to capillary phlebitis.* A curious and singular case of phlebitis of the scalp, resulting from the cut of a razor of the upper lip, which seemed to have been afterwards poisoned by the metallic ink from a pen, has been detailed by Dr. Silvester: the phlebitis was entirely confined to the veins of the face and scalp, and no pus was found after death in the blood, nor in any of the organs or cavities of the body.† The case is interesting, but scarcely leads to the inference of Dr. S. that phlebitis bears the same relation to erysipelas, that bronchitis does to pneumonia. Mr. Dorrington has described an interesting instance, with reference to a few others, of what he calls *globose* or the *melanotic* carcinoma—which shews what peculiar morbid conditions the blood occasionally acquires, by which the soft tissues are converted into identical degeneration over the whole body.‡

Glanders.—The attention of the natural historian as well as of the medical practitioner has been of

* *L'Expérience,* No. 23.

† *Medico-Chirurgical Transactions,* vol. vi.

‡ *Medical Gazette,* February 4 and 11, 1842.

late more frequently directed to that epizootic disease—the glanders or chronic farcy, as occurring in man from contagion, several cases of which have occurred during the last year and been brought before the public. Dr. Hutton mentions four cases in the House of Industry and in Richmond Hospital, Dublin, all of which proved fatal. In all the disease was tested by the inoculation of asses with the mucus of the nares, which was followed by the disease in all the animals, which were killed. The unfortunate patients had all been traced either to have slept near stables, or been employed grooming horses.* Dr. H. says the white areola which encircles the vesicles is pathognomonic, and serves to distinguish the disease from phlebitis. Of the communication of this fatal distemper from man to man, there are, unfortunately, more than two or three instances. M. Berard cites one of a medical student named M. Rocher, who caught the disease from a man in the Necker Hospital, and died on the 16th day. M. Rocher, who was an assistant, while he dressed the man's wounds, had no wound nor scratch on his hands, and is supposed to have taken the disease by imbibition or miasmatic infection.† A nurse in Bartholomew's Hospital, in 1840, was seized in the same way, while attending a man, who died of glanders, but she recovered. A most interesting case of this disease occurred last December in University College Hospital, where a female patient was first afflicted with constipation, enteritis, then

* *Medical Gazette*, July, 1841.

† *Academy of Sciences*, Paris, November 15, 1841.

supposed abortion, and lastly glanders, to the surprise of all in attendance, of which latter disease the woman died. Although no trace of contagious exposure could be gathered before death, it was afterwards found that she had lived in a room above some stables, where a glandered horse and donkey were kept.* M. Berard, in November, last laid before the *Academie Royale de Médecine* some morbid specimens taken from a groom, who died of acute glanders after being affected with chronic farcy. M. Bouillaud also stated, in the same month, the history of a case, the subject of which, though frequently seen before his death by many medical men, as well as by himself, was not suspected to be so iufected, till the day on which he died. The disease was thought to be typhus, but the deceased's father said he had taken care of some *omnibus* horses affected with glanders. Another case of farcy, chronic for three years, and ending in acute glanders and death, was detailed by M. Tardieu, *Interne des Hospitaux*. This gentleman has published a very copious and excellent paper on this disease, where, after noticing in detail the cases before published and some seen by himself, he concludes, that an ulceration of the respiratory passages may be the first, and remain for a long time the only effect of a glanderous infection, and that a man may thus be chronically poisoned without any external abscess. This is not all; the ulceration may be cicatrized, whatever may be its extent, in a very complete manner, and yet the poison may still

* *Medical Gazette*, January 28, 1842.

act, and, at a subsequent period, may explode itself as acute and fatal glanders.* The number of cases lately occurring so frequently in France, and being so fatal, as well from communication with an infected person as from affected animals, has induced the Academy to appoint a commission to make enquiries and report upon the subject; for as M. Bouillaud said, "*Assez des victimes humaines ont été sacrifiés jusqu' ici a ce monstre que vient d'affliger notre monde pathologique; qu' il se contente de sormais de victimes moins nobles.*† This subject has, moreover, been very fully noticed in the *British and Foreign Medical Review* for January last, while reviewing the works of Levin and Rayer, on diseases transmissible from animals to men, to which I would beg to refer those who are interested in this deeply important and fatal disease.

Tinea.—M. Gibert, referring to the opinion of M. Gruby of Vienna, says, that the *favus* of Alibert and the *porrigo lupinosa* of Bateman is owing to the development of a sort of mould or parasitic vegetable, the granules of which are capable of reproduction, and may transmit the disease from one person to another. He instances two cases of girls wherein he verified this.‡ Mr. Buck agrees with M. Gruby as to tinea being a *mycoderm* of the genus *mycodermata* of Persoon. He observed no movements in the globules themselves, as appeared to M. Desmaziere, but only a greater number of actively moving molecules or minute infusoria in the

* *Archives Générales de Médecine*, December, 1841.

† *Encyclographie des Sciences Médicales*, December, 1841.

‡ *Gazette Médicale*, August, 1841.

surrounding fluid. The younger crusts presented many bearded filaments, and in all, the mycodermata were found mixed with epithelial scales.* This description, however, of Mr. Buck's would infer more of an animal than a vegetable structure. Mr. Erischen doubts altogether these statements, and endeavours to show that the disease is a true tubercle of the skin.†

Parasitical Entozoa.—The genus *cysticercus* has been well investigated and its microscopic anatomy disclosed by Mr. Gulliver;‡ and M. A. Aran has edited a very scientific memoir on the hydatids and vesicular worms of the brain. He classes them into four species—first, the *polycephales* or *cœnures*—second, the *echynocoques*,—third, the *cysticercus*, and fourth, the *acephalocysts*, all of which have been found in the brain or its membranes. The symptoms are not diagnostic, being only those of irritants to the parts affected.§

Variola and Vaccina.—I feel it would be transgressing too much on the good sense of this meeting, if I were to occupy any of the time, so kindly granted for this address, by any observations of mine on a subject to which so many members of this Association have occasion to pay so much commendable attention, and which Dr. Baron and Mr. Ceely have of late so fully, so physiologically, and so clearly expounded and illustrated. I cannot, however, fail to express,

* *London and Edinburgh Monthly Journal of Medicine*, February, 1842.
† *Medical Gazette*, December 10, 1841.
‡ *Medico-Chirurgical Transactions*, vol. vi., 2nd series.
§ *Archives Générales de Médecine*, September, 1841.

how much this latter gentleman, both as a medical investigator and a natural historian, has again imposed on this Association and the profession, another call of admiration and gratitude, by his splendid contribution to the last volume of our *Transactions*. We will, therefore, only advert to the useful discussions during the past year, on the identity and non-identity of the variola and vaccine, the attacks that have been made on vaccination, and the zealous and enlightened defence that has been done in its favour by our talented associate Mr. Newnham.

I may here cite a rare instance of a general eruption of vaccinia, in a girl after three punctures in the arm, having been observed by M. Aubry.* It is now well ascertained, that the dried crust is a very effectual and eligible mode of preserving and transmitting the vaccine virus to foreign and warm climates. It is found a very excellent mode of propagation in India; and Dr. Baron and Mr. Coles, have, moreover, succeeded in propagating the genuine vaccine among seven children from the crusts, that were found on the teats of a cow that had gone through the occasional variola vaccina.†

Grease.—The analogous subject of what is called grease has lately elicited a good deal of misunderstanding, criticism, and historical enquiry—whether it is capable or not of infecting the cow or man with vaccine phenomena—whether it is always of one and the same kind, or whether it is of two species; the one, simply a local disease of the heels

* *Archives Générales de Médecine,* September, 1841.

† *Medical Gazette,* September, 1841.

of the horse, and the other a constitutional affection of a specific kind, showing itself in outward lesions of the cutaneous textures, as well as on the heels of the animal. Great utility has resulted from the discussion and enquiry, to which Mr. Ceely has lent his historical talents, and Dr. Baron his judicious solution of the question, by showing that the term grease has been applied too inaccurately and indifferently to two very distinct equine affections; and while any variolous influence must be denied to the one, we have too many observations to doubt in the least, that the other constitutional affection has the property of producing on the cow all the phenomena of the vaccine vesicle. Besides, it even appears that this disease, being communicated to man, either by casual or artificial inoculation, does produce an affection every way akin to that derived from the cow.* It is also now ascertained, that a vesicular eruption protective against small-pox in man is derived from other animals than the horse and cow, for in the province of Lus on the Indus, the milkers of camels are occasionally affected and protected by at least a similarly contagious disease.† Dr. Levin insists on the distinction of grease (Mauke) into two kinds, and gives the separate symptoms of each. He cites a recent and accurately observed case recorded by Hertwig, of the *grease* prevailing at Berlin, where twelve persons occupied about some diseased animals became infected with pustules exactly similar to cow-pox.‡ Jenner, Mr. Loy, and Dr. Bryce, had all formerly

* *Medical Gazette*, November 26, 1841.

† *Ibid.*

‡ *Hufeland's Journal*, September, 1830, p. 122.

observed the identity in the effects of grease with cow-pox. Husson, in the *Dictionaire des Sciences Médicales, Art. Eaux des Jambes,* mentions the case of a coachman, who, while attending a horse labouring under *grease,* became affected with an eruption on the wrist so exactly like cow-pox, that Husson inoculated three children with the matter, from which perfect vesicles formed, and many series of inoculations were propagated. It must, however, be remarked, that nothing approaching to such proofs of the identity of the two affections, or of the transmission of the equine affection to man, has been noticed by English veterinary surgeons; indeed Professors Coleman and Perceval doubt any connection between the two diseases.

Aphtha Epizootica.—This curious erratic disease, from its late prevalence on the continent and in this country, has attracted the notice and study of many observers; and though no professed enquiry, from able hands in this country, has yet been published on the subject, yet there are many detached observations on this singular epidemic. As the *grease* has been observed on the continent to be more indisputably communicated to men than in this country, so has the *Aphtha Epizootica* been considered by Levin as proved to be transmissible to the human subject. It seems to him analogous to the acute exanthemata, and his description of the disease agrees with what has been observed in our island; though I know of no recorded instance of any person being affected by contact, or in any way having symptoms similar to those displayed in the cow, horse, sheep, or pig, in this country. Sagar was the

first to notice the transmission of this disease to man,* but Hertwig in 1834, from experiments by drinking the milk of infected cows, showed it is also communicable by ingestion. Mr. Ceely, in his history of the Oakley Dairy, has shown that the previous variolation of the cows was no protection against this epizootic, which seized them about six weeks after the variolous epidemic. Though fresh light and renewed interest are, from year to year, thrown upon those epizootic and other diseases that are transmissible from the lower animals to man, some of which, as the canine rabies and the glanders, are of the most fatal virulence to the unfortunate individuals infected, yet the subject, both historically and physiologically, challenges further enquiry, for the elucidation of many important points still under much mystery and dispute. This, however, is not to be done by an *experimentum crucis,* as facts are tested in chemistry. Nature only deigns at times to afford us those facilities and opportunities, from which alone such investigations can be pursued; and then only by those gifted minds, which are as rare as the occasions occur, in which they can be exercised.

PRACTICAL MEDICINE.

Enriched as the past year has been by many additions to the repositories of scientific and medical knowledge, of which many will remain the established facts of science, it may be also said, that our Materia Medica has been not altogether unfertile in the published discovery of many remedies,

* *De Aphthis Pecorinis, Vien.* 1765.

or of the modified modes of administering several of those which were already in the hands of the profession. Many alleged remedies, which may rather be called inventions than discoveries in nature, will, no doubt, fret their little hour upon the *broad sheet* or the more noble page of *pica,* till they flit from this changing scene, and give place to some new-born catholicon, engendered in the crucible of egotism, or culled from the simples in the garden of some exceedingly modest interpreter of nature. And though we are more disposed to put a value upon those newly introduced remedies, whose physiological action upon the human frame we can understand, even though they are ushered upon our notice by the *horn* of quackery, than upon those whose action we either, *a priori,* cannot comprehend, or think altogether nugatory; yet, as the useful part of our profession is founded on experience, it behoves us to suspend our judgment on any new article till it is brought to this test. In our ardour for physiological induction, we must remember, that few new remedies will be introduced with all the pleasing chemical therapeia, by which iodine was presented to the medical world by goindet, or with the satisfactory chain of analysis, by which we laid hold of the alkaloid of cinchona—forgetting, perhaps, that the burnt sponge and the Peruvian bark were at first but empirical remedies. The progress, however, of therapeutics has been more marked by the improved or altered exhibition of remedies, long known and used in the practice of our art, than by the real discovery of anything new and good—with the exception of a very few, whose value has not as yet been generally established.

Narcotics and Sedatives.—As this class forms a very principal part of our Materia Medica, every improvement in their pharmacy or in their more general and successful exhibition is, at all times, worthy of our attention. With the view of preserving all the anodyne elements that exist in crude opium, free from the narcotine, a very easy and economical process for this object has been practised and recommended by Messrs. Smith, of Edinburgh; the strength of their prepared solution, almost aqueous, is about four times that of laudanum.* The exhibition of opium by enema has, perhaps, not been so much practised as it might beneficially be done; but since Dupuytren so used it in cases of nervous excitement, as well as in *delirium tremens*, the practice has been more attended to in this country. A case is related by Mr. Maddock, where this mode proved beneficial, after many sedatives had in vain been given by the mouth. Since Dr. Armstrong's bold employment of opium in peritonitis, practitioners have become less timid in adopting a similar practice, and the success which has hitherto attended it has encouraged its further employment. Drs. Stokes and Graves have employed opium, with more or less benefit, in several cases of peritonitis, especially in those of a low type;† and Dr. Watson, in abjuring purgatives, strongly recommends opium in all cases of simple peritonitis.‡ In strangulated hernia it has been of late employed in large doses, with the view of narcotising all the sensitive and muscular irritability; and in two cases,

* *London and Edinburgh Medical Journal*, August, 1841.

† *Dublin Journal of Medical Science*, No. 2.

‡ *Medical Gazette*, February 25, 1842.

apparently in *articulo mortis*, perfect recovery took place in the hands of Mr. Busk, from doses of four grains every four hours, for three times. Mr. Mayo also treated a case equally successfully.* Similar benefit continues to be derived from opium in acute rheumatism, and it is found to be a much safer remedy than having recourse to venesection, except when an internal organ is affected. Dr. Theophilus Thompson has instanced a case of this acute disease, in which seventy grains of opium were given in four days, with a perfect recovery in seven days.† The drug is observed by some to increase the deposit of lithic acid in this disease, and many think it acts better when combined with calomel. Where a poisonous dose of laudanum was taken, to the extent of ℥ij., the electro-magnetic apparatus was employed by Dr. C. B. Williams, with much success, in exciting the sufferer to consciousness, till perfect recovery took place. He conceives electricity is not such an exhausting mode of keeping a person awake, as the being forcibly kept so by bodily exertion.‡ The anti-neuralgic virtues of veratria have been corroborated by Dr. Tunstall, from a case of spasmodic and painful affection of the larynx, which was effectually cured by the alkaloid, in the form of ointment to each side of the cervical vertebræ, after every variety of depletion, counter irritation, and anodynes had been used in vain.§ Of the efficacy of strychnia in chorea, M. Foulhieux, of the Hotel Dieu at Lyons, speaks

* *Medical Gazette*, February 18, 1842.

† *British Association, Medical Section*, 1841.

‡ *Lancet*, July, 31, 1841.

§ *Provincial Medical Journal*, August 14, 1841.

favourably, from his successful treatment of one case, in which, however, a furfuraceous eruption took place, and may have contributed to the cure.* A more satisfactory and general result has attended the rubbing in of the tincture of aconite, on parts affected with the acute pains of neuralgia and chronic rheumatism, in the practice of Mr. Curtis.† A case of very advanced ileus is mentioned as being cured, by an injection of the root of belladonna, by Mr. Becker.‡ Of the effects of opium and other medicines of this class pushed to narcotism in obstinate neuralgic affections, my predecessor has taken due notice, and the practice is thought perfectly safe in the hands of a careful physician.

From the known effects of the datura stramonium in large doses producing delirium and illusions, M. Moreau, of Tours, was induced to exhibit it in the idiopathic hallucination, arising simply without any mania or monomania of a chronic nature. Of ten persons labouring under these hallucinations, seven were perfectly cured, one much relieved, and two resisted the action of the stramonium. It was given in different doses, even to a poisonous extent, when stupor remained for an hour and a half, but recovery took place, and with it disappeared the epilepsy with which the patient was also afflicted.§ The principle of cure seemed to be founded on *similia similibus curantur*. The subduing effects of tobacco by way of enema has been successful in a

* *Gazette Medicale.*

† *Lancet*, June 26, 1841.

‡ *Gazette Médicale;* from *Provincial Medical Journal*, 1841.

§ *Gazette Médicale*, No. 43.

case of severe traumatic tetanus by Mr. Bullock;* and in another instance of equal severity from a burn, the exhibition of large doses of assafœtida led to recovery in the hands of Dr. Watson of New York, in addition to two other cases treated in the same manner.† A case of *rabies canina* has been successfully treated by the *veratrum sebadilla*,‡ and it appears, that the Mexicans use it much against the same disease. Tinct. cantharid. has been highly recommended by Dr. Seymour in simple paralysis, in the absence of evident disease in the head or in other cavities of the body.§

Mesmerism.—I scarcely know whether I may here notice a new species of moral narcotics, which has been of late revived, if not newly introduced, into some parts of the kingdom, and held to promise more for the relief of physical suffering among mankind, than all the discoveries in medical science for the last 200 years. One of the first glimpses of this new Promethean agent appeared in our loug respected northern Medical Journal for October last, where the lingering and painful palsies of many years standing were, said to be dispelled *a premier coup*, by friction with an ounce-glass phial, in the hands of a talented member of the profession. Since this literary announcement and respectable *dèbut*, the spirit of discovery has rapidly proceeded; and now the halt and lame are made to walk, the blind to see, and the deaf to hear, at the *twinkling of an eye*. Teeth are now

* *Medical Gazette*, July 2, 1841.

† *American Journal of Medical Science*, November, 1841.

‡ *Bulletin Therapeutique.*

§ *Provincial Medical Gazette*, February, 1842.

extracted without pain, the surgical incision made without the least consciousness on the part of the patient;* and the pains of parturition have been even declared by one of the first masters of the art to be sensitively suspended, with an acceleration of the muscular activity of the uterus, by this wonderful physiological discovery of the nineteenth century.† It would ill become me, as it is not in my power, to say what of all these sayings and alleged doings is worthy of your attention. The difficulty is in separating the *vrai* from the *vraisemblable;* for there are many phenomena enlisted under the dominion of mesmerism and *neurohypnology,* which are frequently found exhibiting themselves under the protean forms of hysteria, catalepsy, somnambulism and ecstasia—the pathology of which we cannot at all times explain; but that is no reason why these diseases should be recast and dramatized for the wonderment, if not the delusion of the public. Divested of the extrinsic exhibition of *corks, rods,* and *passes,* many of these boasted phenomena appear to be founded on an exstatic concentration of mental attention, improved much by practice and education; so that the exhibiters become adepts, as the priest mentioned by Celsus, "*Qui quoties volebat, mortuo similis jacebat, auferens se a sensibus, et quum pungeretur, dolorem non sensit.*"‡ It must, however, be granted, as a redeeming point in the character of modern mesmerism as practised in this country—

* *Medical Gazette,* July 8, 1842.

† *Manchester Guardian,* April 2, 1842.

‡ *Burton's Anatomy of Melancholy,* p. 166.

spurned though it was from the halls of the late meeting of the British Association, as a subject unsuitable to legimate science—that it has disenchanted the animal magnetiser of that positive fluid alleged to reside in his body, and by the emanation or projection of which upon other persons, all the wonderful phenomena were stated to have been produced. The initial emotion is now held to arise in the patients themselves, and so far the resulting phenomena are brought somewhat under the domain of physiology, and the true portion of them may henceforth be rationally explained, on some remote terms of the animal economy, though at present they are sadly bedizened and overlaid with the "pomp and circumstance" of the stage.

Alteratives and Tonics.—Iodine and its preparations continue to increase in their applications to various diseases involving or threatening organic or nutritive changes, and also in the several forms of secondary syphilis,* and in iritis.† The iodide of potassium has been well spoken of by Mr. Stafford in injuries of the spine;‡ and the vapour of iodine has received the favourable testimony of Mr. Dixon of Whitehaven and Dr. Wilson, London, even where hectic fever, dyspnœa, and many other advanced symptoms of phthisis have come on. Owing to the uncertain effects of iodide of iron, arising principally from its proneness to decomposition, M. Dupasquier has endeavoured to remedy these defects, by first

* Mr. J. W. West, *Medical Gazette.*

† Dr. J. C. Hall, *Ibidem.*

‡ *Medical Gazette,* February 4, 1842.

procuring a pure solution of iron filings in iodine and water, which he afterwards preserves in a syrup of orange flowers; its preservation is thus obtained from the known effect of saccharine matter arresting the oxidation of metals or their protoxides.* Mr. Scholefield has, however, given a more simple and ready formula, for the preparation of a syrup of the iodide of iron,† than that of Dupasquier. A new combination, the liq. hydriod. arsenic. et hyd. has been introduced by Mr. Donovan, and has been reported well of by some of the profession.‡

On the solubility of urinary calculi, the Academy of Sciences received a report from MM. Pelouse and Gay Lussac on various communications from M. Leroy d'Etoiles in March last. From the experiments made also by the reporters, they found the waters of Vichy to have a superior effect to the alkaline carbonates or bicarbonates, which they attribute to the great quantity of carbonic acid naturally in these waters. They experimented with drilled boxes containing various calculi. They corroborate, moreover, the experiments of Dr. Ure in finding the borates more powerful solvents than the carbonates or mineral acids, of calculi long immersed in their solutions, some of which were for twelve months. They conclude, that the attempt to dissolve calculi by injections, even with the borax, is ineffectual; and also that their experiments with the borates of soda or alkaline carbonates, taken internally with or without benzoic acid, were unsatisfactory, as they could

* *Bulletin de Therapeutique.*

† *Pharmaceutical Journal,* March, 1842.

‡ *Medical Gazette,* August 6, 1841.

not detect the slightest trace of hippuric acid in the urine.* Thus the vital affections and the caprices of the organic laboratory produce different results in the hands of different experimenters, and lead to discrepancies that often puzzle the man of practice and benevolence, till time and the case-book decide the issue. Dr. Hannay's method of treating cynanche tonsillaris with powdered guaiacum in mixture, is found to succeed well with Mr. Bell and Dr. Carson of Coleraine.† *Cod's liver oil*, the *Ol. Jecoris Aselli*, has lately been re-introduced into notice by Dr. Bennet, as a very efficacious alterative in chronic rheumatism, nodosities of the joints, and in instances of perverted and languid nutrition.‡ This oil seems also to be getting into very general repute among the German and Dutch practitioners, as an effectual alterative in many chronic and sub-acute diseases.

The appearance of a blue line along the gums has been much remarked of late in cases of colica pictonum, and has been held diagnostic of the salts of lead having been for sometime exhibited or absorbed. This bluish hue has been attributed to the sulphocyanogen in the saliva, forming a sulphuret of lead.§ For the relief of the bowels in lead-colic, Dr. Wilson has employed, with much success, the injection of warm water, while the

* *Academy of Sciences*, March 21, 1842.

† *Medical Gazette*, November, 1841.

‡ *London and Edinburgh Monthly Journal*, November, 1841.

§ *Provincial Medical Journal*, March, 1841; *Medical Gazette*, December 1841; *Ibid*, December, 10, 1841; and *Monthly Medical Journal*, November, 1841.

patient was in the bath.* This practice is likely to be followed, as it fulfils two favourable indications—the relief of the spasm and pain, and also the evacuation of the bowels.

Among the articles lately recommended, with more or less confidence, to notice and for adoption, is the *ol. asphalti* in phthisis;† *pitch* in psoriasis;‡ and the *male fern*, in doses of fifteen to twenty grains with castor oil, in cases of tape worm, by Professor Wawruch, who gives a long statistical list of cases, for the most part thus successfully treated.§ The *nitrate of silver* is highly spoken of, in many cases of mucous inflammation, where it has not been hitherto used, and in all cases of diarrhœa, by Dr. Macgregor;‖ nor should we forget the *clinkers* from the forge, recommended by Mr. Edwards as a powerful and specific tonic;¶ nor elecricity, as applied to the cure of traumatic tetanus by Mr. Adams.** The *hydrocyanate* of *iron* is stated by M. Janson as being long successful in his hands for the cure of epilepsy;†† and Professor Negrier speaks as confidently of the anti-scrofulous powers of the leaves of the walnut.‡‡ To increase the powers of sea water in strumous complaints, Dr. Nardo macerates for several days, and exposes to the sun, a certain

* *Medico-Chirurgical Transactions*, vol. xxiv.
† *British and Foreign Medical Review*, October, 1841.
‡ *Provincial Medical Journal*, January 22, 1842.
§ *Edinburgh Medical and Surgical Journal*, January, 1842.
‖ *Lancet*, September 18, 1841.
¶ *Provincial Medical Journal*, February 5, 1842.
** *Medical Gazette*, January 28, 1842.
†† *Journal des Connaissances Medico-Chirurgicales.*
‡‡ *Archives Générales de Médecine*, June, 1841.

proportion of marine algæ in the salt water till the liquid acquires a very strong marine odour; it is then used locally, or added to the baths.* The *prussic acid* has been given very successfully by Dr. Schlesier, of Peitz, in severe angina pectoris after every known remedy was tried.† Dr. Clay has also renewed our attention to inspissated *oxgall*, given in pills in certain diseases, as jaundice and several forms of dyspepsia, and has detailed ten cases much in favour of its continued use.‡

I shall not now, at this stage of our address, trespass further on your time, by noticing several new additions to the Materia Medica, such as *taraxacine* and *phloridrine*, nor yet enter into the dietetical and medicinal uses of what are called *gluten*, *pharmaceutical*, and *ferruginous bread*, since every new article, that can possibly interest the medical practitioner, is forthwith culled and statedly noticed in those lately instituted and valuable repertories—Mr. Braithwaite's *Retrospect*, the *Pharmaceutical Transactions*, and last, though not least, the highly valuable and rapidly rising *Journal*, I may say, of this Association.

Homœopathy and Hydropathy.—In concluding our notice, however, of passing therapeutics, perhaps it may be thought disrespectful to the reputed fame of Hahnemann, if we did not pay an infinitesimal remark to the state of his doctrine; but as there is reason to infer that his system is dwindling "small by degrees and beautifully less," the time is gone by when any lengthened remarks

* *Il. Fliatre Sebezio*, 1841.

† *Encyclographie des Sciences Médicales*, January, 1842.

‡ *Medical Times.*

by me could either amend or prejudice the doctrine in question. Instead of which positively innocent, though negatively most injurious system, we are now threatened with a flood of waters, bearing the flaring banners of hydropathy, hydro-therapeia, and hydro-sudopathy; and whether they are destined, from the breath or winds of popular affection or delusion, to submerge for awhile the temples of sober and enlightened medicine, still we may be confident that these foaming waters will in time assuage, and permit the goodly structures of reason and science to reappear with renewed pride and usefulness. As my predecessor very presciently, last year, told this Association, that before long we should have the professors and disciples of this hydropathic doctrine in sufficient abundance among ourselves, so the by-past year has given us several works and literary notices on the water system of Priessnitz,* all applauding more or less the wonderful effects of this sanatory pool of Gräefenberg, and the benefits derived from wet bed-clothes. I even perceive that some of the peasantry in Flanders are quacking themselves with linen compresses, wetted from time to time in the ditches by the way-side, and applied to their bare abdomens.† To this we may say—"*O dura ilia messorum!*"

FORENSIC MEDICINE.

The increasing interests of advanced society continue to require a greater precision of the rights and inviolability of both person and property, and, con-

* *Hydropathy, &c.*, by R. T. Coleridge, Esq., 1842; *The Water Cure*, by James Wilson, M.D., 1842.

† *Archives de la Médecine Belge*, January, 1842.

sequently, a closer study of forensic and toxicological medicine. In regard to the subject of infanticide, Dr. Guy, in addition to his former investigations, has brought forward a fresh series of observations on the *static* test, showing, that from 210 instances of the weight of the lungs in still-born children, and 641 of the lungs after respiration, 862 grains is the mean weight of the former, and 1,110 grains that of the latter; while the general statements of medico-legal authors were 480 and 960 foreign grains. As to Ploucquet's test, he found, from 190 observations by himself and others, that the mean before respiration is as one to 62.6—the weight of the body; and from 610 observations on respired lungs, it was as one to 46.6; while the mean of other recorded observations is as one to fifty, and as one to forty, nearly. He further shows, that the weight of the lungs is very slightly augmented by imperfect respiration; that the weight of still-born children is greater than that of children born alive, amounting nearly to one-third; and that the weight of the lungs varies more than that of the body.*

The stormy discussions that have lately taken place in the Academy of Sciences have rendered our analytical knowledge of the habitudes of arsenic, as it affects the human body, much more precise; and though the intemperate reclamations of MM. Danger and Flandin obscured, for a season, the calm perception of the truth, yet their researches have served to correct somewhat of our easy confidence in several modes of analysis that were previously adopted. Orfila, though he once affirmed that arsenic existed normally in human bones, has now

* *Edinburgh Medical and Surgical Journal*, January, 1842.

given up his opinion in this matter, especially as he could not produce any before the Academy, in which altered opinion he now coincides with the above toxicologists and Dr. Rees.* An author, in the *American Journal of the Medical Sciences*, October, 1841, denies the human organs in their natural state to hold any arsenic, and conjectures whether Orfila at first might not have been mistaken, from the effects of the quantity of garlic that is eaten by the French; but how this could have affected the analysis, except by the odour, is not easily seen. Professor Liebig has very ingeniously contrived to account for the deadly nature of minute quantities of arsenic arresting the vital organism of the body, on the chemical principle of equivalents; for he says the atomic weight of albumen being 7,447, of animal gelatine 5,652, and of anhydrous fibrine 6,361, each of which will combine with one equivalent of arsenious acid, or with one of corrosive sublimate, therefore the chemical union of these organic elements with the metallic salts destroys their vital combinations and functions.†

Mr. Marsh has made several improvements in the process of detecting arsenic by his apparatus, such as in the form of the jet tube, and by igniting the gas, while there is held, about one inch above the level of the flame, a piece of porcelain or glass moistened with the ammonio-nitrate of silver. If arsenic has been united with the hydrogen, yellow arsenite of silver will appear; if not, the surface is either blackened, or no change takes place.

MM. Köppelin and Kampmann use chloride of

* *Guy's Hospital Reports*, April, 1841.

† *Liebig's Organic Chemistry, as applied to Agriculture*, 1842.

barium in the tube to dry the gas before igniting. Orfila uses dry asbestus in a horizontal tube. That the apparatus, as commonly used, requires much alteration to make it a scientifically constructed instrument for analysis, is very evident. There have been several modifications proposed, but that of Dr. Broèck,* on Döbereiner's plan, seems the most eligible. A very common source of error and vitiation in the trials by Marsh's apparatus, is the contamination of sulphuric acid, and even zinc, with arsenic—from the zinc being mineralogically combined with it, and the acid being manufactured lately in great quantities from iron pyrites, which contains arsenic. Dr. Rees found no less than twenty-two grains of arsenic in a pint of commercial sulphuric acid; and other chemists throughout the country have even detected larger quantities of the poison in the acid. To this dangerous impregnation, a very respectable chemist in Dublin lately fell a sacrifice, by inspiring hydrogen gas by way of experiment, which had been procured from the acid and zinc of commerce. It was calculated by Dr. Reilly, that the arsenic inhaled by Mr. Brittan must have been twelve grains.† I need not speak further on the general confidence in Marsh's apparatus as a chemical test for arsenic, when the materials are pure and every precaution taken, but conclude with the Report of the Royal Academy of Medicine on the subject. "First, that when the carbonization or incineration of the animal matter is incomplete, there are sometimes obtained, by the

* *Bulletin de la Médecine Belge*, November, 1841.

† *Dublin Journal of Medical Sciences*, vol. xx.

use of the apparatus, stains which, without being arsenical, may have a similar appearance. Second, that it is impossible to confound those stains with arsenic when they are submitted to heat and chemical agents, and that the apparatus is capable of easily rendering sensible the $\frac{1}{100,000}$ part of arsenious acid in a fluid, and the stains begin to appear with a fluid containing about $\frac{1}{2,000,000}$ part of the acid." Notwithstanding the correctness of this as a chemical test, I do not know of any evidence from this test, affecting the life or liberty of a person, having been exclusively tendered in a court in this country; and I question whether any medical jurist would remain satisfied with proffering this evidence by itself in such cases. The hydrated oxide of iron still increases in repute as a very effectual and chemical antidote to the poison of arsenic. Orfila bears good testimony to its antidotal powers;* and Dr. Beck, besides bringing forward a host of authorities and instances in its favour, details the best mode of administering it and having it always ready for use.†

Liebig says, that the nitrate of silver would be more poisonous if it were not always decomposed by the hydrochloric acid or the marine salt present in the stomach, and that the medicinal action is always owing to the muriate. It would be worth enquiry, if there is no acid found in the stomach, when the eyes and skin become tinged from the nitrate. Dr. Buckler of Baltimore has proposed a very elegant antidote to the bichloride of mercury, by the exhibition of gold leaf and iron filings in

* *Bulletin de Therapeutique.*

† *American Journal of the Medical Sciences.*

the minutest possible division. The decomposing action is galvanic, and the mercury is reduced to the metallic state in the stomach.* When these metallic powders are not in readiness, it has been proposed to forthwith administer such things as a bunch of bright keys and a few sovereigns. The action of bromine and its compounds has lately been extensively investigated, in a prize essay, by Dr. Glover; wherein he has shown that its physiological properties are between chlorine and iodine, and that the chloride of gold is its preferable test. Hydrobromic acid is less powerfully corrosive and irritant than the simple body.†

In connection with toxicology, the question of the time required for a poison to diffuse itself throughout the system or to the part affected, after its introduction by a wound or the stomach, has always been much discussed, and generally where the toxic effects were speedy, the channel of nervous sympathy has been rather looked to than the vascular current, to account for the rapidity of the symptoms. To elucidate this point, Mr. Blake has ascertained, from well-conducted experiments on animals, that the time required between the absorption of a poison by the capillaries, and its general diffusion throughout the body, may not exceed nine seconds—that a greater interval than this elapses between the introduction of a poison and its first effects, and that the nearer the poison is infused to the brain, its effects are produced the more rapidly.‡

* *Lancet*, January 22, 1842.

† *Edinburgh Med. and Surg. Journal*, Harveian Prize, July, 1842.

‡ *Ibid*, October, 184

The number of fatal accidents, suicides, and murders, arising from the ignorant and irregular administration of powerful medicines, and the facility with which the most deadly poisons are procured by any person at the lowest druggist shops, ought surely to arouse the attention of the legislature. This part of social polity has long been in a state worthy only of a government most indifferent to the obvious rights and protection of civilized society. The profession have had too much occasion to call the repeated attention of the public to this glaring defect in our social economy, without as yet any avail; and though the new institution of pharmaceutists promises to prevent some of the evils complained of, from an increased education and a self-regulated system among its members, still much is wanted in the way of legislative enactment. There are several relative subjects which I intended to notice, such as the recovery of fees by the different orders of the profession, and the recurring question of medical fees and the insurance offices; but, as our time is pressing, I will simply leave this last subject to the opinion delivered in the *British and Foreign Medical Review* for April last—which verdict was hailed by some of the offices, and circulated by them for to act as an extinguisher upon all present medical reclamation.

MEDICAL STATISTICS.

The numerical system, which was sometime ago proposed as a valuable auxiliary to therapeutic medicine, has not succeeded in acquiring that influence among, and attention from, practitioners, which, from its respectable and eminent advocates,

especially Louis and Andral, was for a while anticipated. However much this study is calculated to be of great service, in the fitting out of a medical staff and equipment for particular climates, localities, or special services of war and colonization, or even in planning the departments and materia medica of an hospital, yet as the science affords so little guidance to precise indications in the treatment of individual cases, it has received little encouragement or respect from the bedside practitioner; for cases are *there* to be studied not numbered. Besides, it is found, however perfect our numerical calculations may be, from any extended amount of instances in even one species of disease, that "*multa sunt dissimilia, sexus, ætas, animus,*" and that "*nihil magis ægris prodest, quam ab eo curari, a quo volunt.*"*

Medical statistics have, however, been very instructively applied to many interesting subjects in nosology and pathology, and we are from time to time favoured with some valuable reports from public medical institutions—evincing great comprehensiveness of mind, as well as great practical analysis and acquaintance with disease, on the part of the reporters. It is much to be wished, that their example were more generally followed by gentlemen attached to our infirmaries and hospitals throughout the country, as a common debt to the profession, and, on the part of many, to the *Transactions* of this Association.

In addition to our previous statistical reports, we

* *Seneca, Controversia,* vol. ii., p. 293.

have this year the very valuable one from the Chester General Infirmary by Mr. Peacock, and the excellent notes on typhus fever in the Aberdeen Infirmary, for a period of three years, by Dr. Kilgour. We have also a report of fever from the House of Recovery at Carlisle, during the same period, and a very excellent and precise report of the diseases and deaths in the Marylebone Infirmary, from the pen of Dr. Boyd in December last—since followed by the continuous report of his very valuable and elaborate pathological contributions, now extending to 157 cases, with the *autopsia* of each, and also a luminous statistical statement of the diseases of the out-door patients of the same establishment for three years.*

In special statistics, the dimensions of the heart in all directions, with those of the several orifices and trunks of the great vessels, have been carefully taken and compared by Dr. Ranking.† Dr. R's analysis would have been much more complete and practical, if he had also given the weights of the heart; as this mode is much more susceptible of precision than the measurements of a soft and inelastic piece of muscle, when deprived of life. The great prevalence of diseases of the heart has been statistically shown by the industry of Dr. John Reid, who, out of 400 *autopsiæ*, during little more than two years at the Royal Infirmary of Edinburgh, found fifty-one persons to have organic diseases of the heart, or aneurism of the aorta or

* *Edinburgh Medical and Surgical Journal*, July, 1842.

† *Medical Gazette*, March 4, 1842.

arteria innominata, which were the chief or sole causes of death.* The statistics of phthisis have also received renewed attention and investigation from Mr. Gilbert in his late work on "Pulmonary Consumption, &c.," current articles in the *Medical Gazette*, and from Mr. Noble at the last meeting of the British Association. Dr. Macleod has also investigated those of rheumatism in his late treatise; and new observations upon the pulse in infants have been made by M. Trousseau, which differ little from what is generally known†—his conclusion is, that the pulse is of little use in treating their diseases during the early months. It is but doing a faint meed of justice, at this time, to mention the highly valuable and numerous statistical tables, on the health of the Navy, that have been lately published under the superintendence of the Inspector-General, Sir Wm. Burnett.

The very elaborate Annual Report of the public registration of deaths is well worthy the inspection of the medical practitioner and philosopher, especially since the bare columns of figures are so usefully and scientifically collated and analyzed by Mr. Farr, who has also much increased the value of the last appendix to medical men. Notwithstanding the extreme labour and the extensive analysis that are from year to year applied to these reports, yet the tables of diseases want that precision and trustworthiness, which the medical analyst looks for in his more definite investigations. This defect arises from the imperfection and looseness of the primary

* *London and Edinburgh Monthly Medical Journal*, February, 1842.
† *Journal des Connaisances, &c.*

data; for it is well known with what vagueness and carelessness the name of a disease is often inserted in the certificate of death; and it is much to be feared this will continue, till medical men are encouraged to take more interest in the subject, than can be expected from their gratuitous services. The nosology of the tables is also not free from errors, as has been occasionally pointed out by medical writers; but it is a difficult task to make out an unexceptionable nosological chart. Provisionally, the nosography might do, or even permanently, as a Police matter, but when it is about to be imposed by the Poor-Law Commissioners,* for adoption by the medical officers of all the unions, it is much to be wished that the nomenclature had been previously submitted to some of our medical colleges, in order to prevent any invidious conflicts between the followers of the classical and the lay nosologists; and to save the dignity of the rising profession when in any scientific dilemma, from referring possibly to Somerset House, instead of to the less official, but more venerated, authorities in medical science and literature.

MEDICAL LITERATURE.

Notwithstanding the immense number of records and volumes that have been published in the by-past history of medicine, so that a literary Pelion may almost be heaped upon Ossa, the press still continues to teem with medical productions, many of which, if not still-born, only live to linger out a dwindling and obscure cachexy; while others, for

* *Poor-Law Commissioners General Order*, March 12, 1842.

the credit and benefit of the profession, both present and to come, show a lusty and vigorous conformation, that will ensure to them a long vitality and influence on professional literature. The sixth volume of the *Royal Medico-Chirurgical Transactions,* has laid another claim on the grateful consideration of the profession from the many valuable papers which it contains, among which is one by Mr. Gulliver on the *Cysticercus,* and one by Dr. Hall on the Pathology of the Nervous System.—It would be a dereliction of our bibliographical duty, not specially to mention the highly meritorious work of Dr. Carpenter on the Principles of Human Physiology—a work to which, there has been none published of equal value in the department of which it treats—embodying, as it does, an immense store of facts and modern discoveries in anatomy and physiology, down to the present time. Neither can I omit expressing my highest meed of estimation of the profound literary production on the Physical History of mankind, by his townsman, our eminent associate, Dr. Prichard. Though Dr. P's lately published third volume is not strictly a professional work, yet I do not know any class of readers who will peruse it with more interest and understanding than the enlightened medical philosopher, as it embraces so many physical and physiological considerations, only to be sufficiently appreciated by minds that have been medically taught. The celebrated work of Professor Wagner has been introduced into this country by the able translation of Dr. Willis; and all who have seen that master treatise on minute anatomy and physi-

ology, and especially the superbly finished Icones, will say that these sciences have been eminently enriched by this production.—In a similar department, the valuable work of the Prosector Gerber, of Bern, has been put into an English dress by the accomplished hands of Mr. Gulliver, who, from his kindred researches and acquirements, was well qualified to do the German physiologist justice. *The Cyclopædia of Anatomy and Physiology* is still continued on that high platform yet deep research in science, with which it began its honourable career; and the last numbers 23 and 24 are not behind any of their predecessors in several first-rate articles; as the *Monotremata* by Professor Owen—*Animal Motion* by Mr. Bishop—*Mucous Membrane* by Mr. Bowman, and other able articles by Mr. R. Jones, Mr. Newport, Drs. Alcock and Todd.

The late work of Professor Liebig on the organic chemistry of physiology and pathology, to which we have occasionally referred in this address, is another splendid addition to our medical literature, and well merits the deep study and attention of those who are pursuing the recondite mysteries of the human frame. Few original monographs on the elementary sciences of medicine have, however, appeared in this country, but there has been no lack of practical treatises, manuals, and compendiums, in every branch of physic, down to bedside companions and diamond editions of the pharmacopœias—fitted to be worn in one waistcoat pocket, while time, precious time, is chronicled in the other.

It would be ungrateful, if not unjust, to omit adverting to the increasing diffusion of all matters

of medical knowledge, by means of our periodical literature devoted to this special purpose; and, however valuable this highly respectable and useful portion of the press has hitherto been, still I may congratulate this meeting on its augmented improvement and usefulness to all orders of the profession throughout the three kingdoms, and specially offer my feeble but sincere testimony to the increasing value of what we may be permitted to call the foster-child of this Association, the *Provincial Medical Journal;* which I make no doubt, supported as it is by its numerous patrons, will, under the talented tutelage of its eminent editors, soon arrive at a vigorous and enduring manhood.

Gentlemen, in bringing our annual retrospect of medical knowledge and practice towards a close, we would not be forgetful of those members of our Association, or of those distinguished in the profession at large, who have lately been removed from this toilsome scene of their researches after truth, and of their usefulness here, to that world where, we are told, we shall know even as we are known. In paying our dutiful tribute to the memory of those worthy members who have passed from us during the past year, I would beg, from my own knowledge of the late Dr. Newbold, to mention the loss which the Manchester Royal School of Medicine and a large public medical charity have sustained by his death; and from my long acquaintance with the late Dr. Baird, I am sure his public services to the Institutions of Liverpool, and the cheerful application of his skill and talents to all orders of his patients,

cannot but be long and affectionately remembered. His death was a subject of deep regret to the Newton Branch of this Association, from the friendliness of his manners, and the interest he always evinced in the prosperity of the Branch, both by his attendance and his contributions. His mortal illness was rapid; and when the members of that Council fully expected his attendance, according to his own promise a few days previously, he was a corpse—cut off in the full meridian of an active and useful life. On this occasion I need not attempt to excite the yet unsubdued regret which the sudden death of Sir Charles Bell, our highly esteemed honorary associate, has produced in the medical world. Full of fame, as he was ripening fast in years, though with an intellect and industry undiminished, he closed in a moment, as it were, his eyes for ever on a life of scientific usefulness and splendid pursuits, which were crowned, as far as the imperfect state of science and of all things here will permit, with eminent success—sufficient to enrol him with the Harveys, the Hallers, and the Hunters of the bygone age; while the virtues of his private character will enumerate him with the good in all countries. It would be almost disrespectful to the memory of this great man, for me to attempt at this time any detail of his labours, discoveries, and reputation. They live and will exist, for the benefit of this and future times, in the history of our profession, to the members of which, we may say, "*Magnorum virorum, non minus presentia, esse utilem memoriam.*"* The profession has also suffered the loss of several distinguished and esteemed individuals out of its ranks

* *Seneca, lib.* i., epistle 318.

during the year, among whom we must mention Dr. Birbeck, a physician of much respectability, great benevolence of mind, and eminently celebrated for the zeal, judgment, and munificence, with which he established and promoted popular institutions for the diffusion of useful and scientific knowledge. Dr. D. Davis, of University College, has also closed a long professional career of usefulness; and his works on obstetric medicine testify him to have been a man of considerable talent. The long and active life of Dr. Yellolly has also ceased from its various labours of science and utility. Dr. Y. was held to be an accomplished medical philosopher, as many of his papers testify. He was one of the founders of the Medico-Chirurgical Society, and he enjoyed the friendship of our first men of science. In our foreign obituary, we have to notice the death of that talented surgeon of the Hotel-Dieu, M. Sanson, of M. Devergie of Paris, and of M. Fricke of Hamburgh, both also highly eminent for their surgical and therapeutical talents; and the death of M. Pelletier, the discoverer of the sulphate of quinine. Nor must we fail to remember the loss which botanical science has suffered in the death of M. de Candolle, the enlightened founder of almost a new system in that branch of natural knowledge. We have also to add that Baron Larrey has very recently paid the debt of nature, and finished his very long professional campaign, from the days of Napoleon in Egypt, who called him the best of men, to his late expedition to the French army in Algiers—in returning from which he is reported to have said, "I have now only to die."

In conclusion, I very much fear that I have trespassed too far upon your kind indulgence and patience, in the attempt which I have made of bringing before you this retrospective view of the state of medical science and of the profession. I feel I have very inadequately fulfilled the honourable function, to which the Association has been pleased to depute me. As some apology, wherein I have come short of my own wishes and your just expectations, I, however, have to plead that I am but an unpractised *cicerône* in the vast gallery of medical facts and records; and though I have endeavoured to direct attention to the more prominent and useful objects in the path of our yearly progress, and ventured at times to pronounce my undigested remarks on the history and value of many of the objects reviewed, yet I am aware I have passed over several others of as interesting a character, but of a more speculative and sketchy nature, than those to which we have pointed your attention. I may, even, have omitted to solicit your notice to some cabinet article, or to some delicately wrought gem of science or of literature, that may have lain in the course of review, but I have at least had some respect to your taste and wishes, in not proffering to you the simply agreeable and piquant, instead of that which belongs to sound science and utility. It is, moreover, highly probable, that though many important objects in the distant and hazy horizon of medical knowledge, at present, appear but glimmering and undefined, yet, I make no doubt they are fraught with valuable truths and with fresh interest to the onward explorers

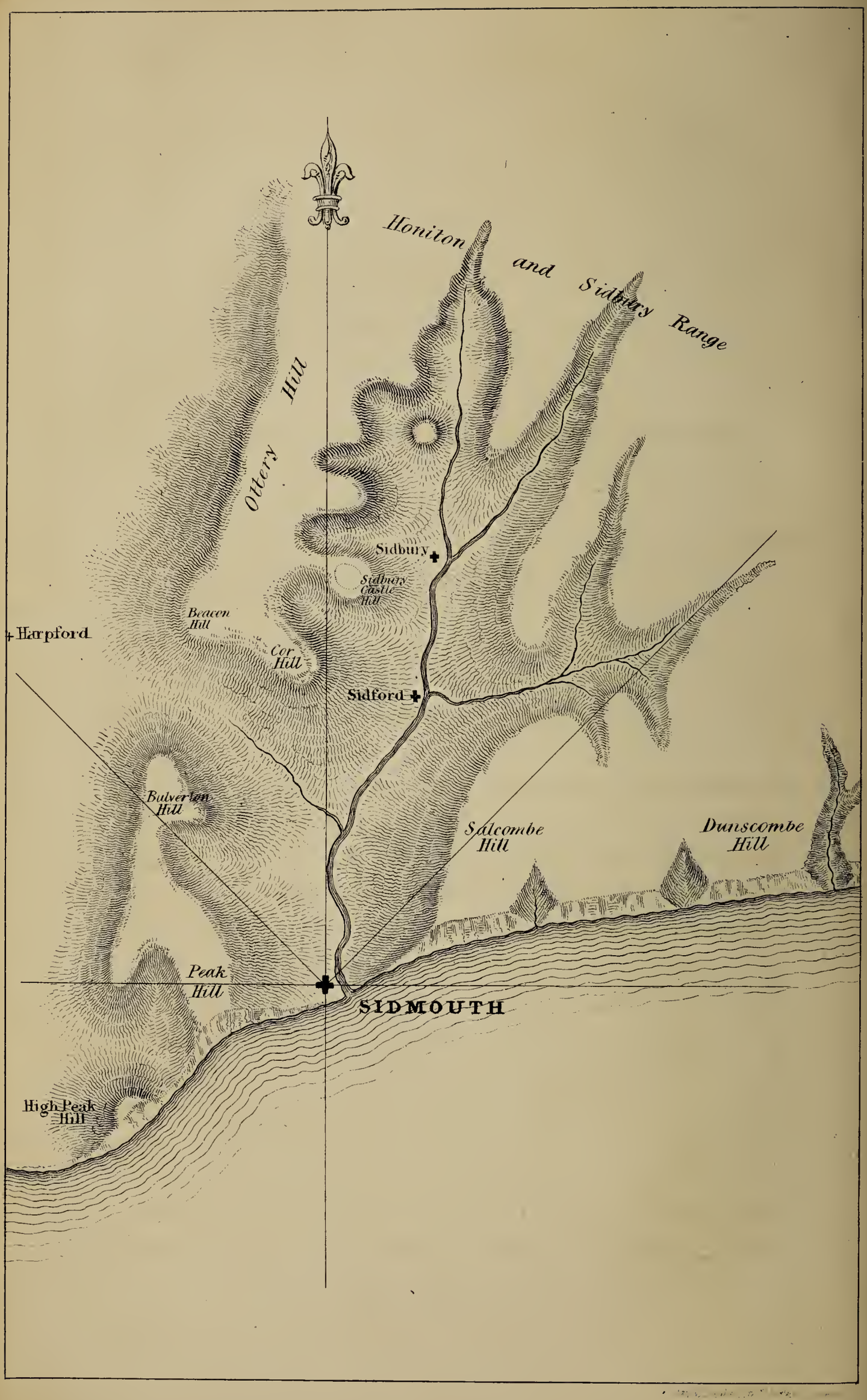
of science. Many of the facts and inductions that establish and surround our present path, once appeared as airy and undetermined; so we may reasonably trust, as the day of intellect continues to dawn, and the shadows to fly away, will our career to the meridian light be enriched by accumulated facts and observations, which the corresponding increase of genius and skill will better arrange and systematize.

For these great and beneficent ends, with no arrogant nor exclusive pride, we hold that this Association is instituted; and so, with no overweening confidence, we think that it is destined to fulfil, in conjunction with other societies of a similar character and aim, many of the lofty and virtuous purposes which all zealous and good men, attached to the pursuit of the profession, have in view.

Associations, such as these, peculiarly mark the character of the age in which we live. They are publicly instituted on the wants and requirements of the profession, as well as on the declared pledge of furthering medical knowledge. They also invite and challenge the attention and respect of our fellow citizens; while in some measure they also provoke the just scrutiny and the *cui bono* of the moral and political philosopher. As our banner is then unfurled, and our guerdon great, so are our honour, our industry, and our zeal, committed to redeem the implied bond, now in the hands of our brethren and the public. To absolve ourselves, then, of these high duties, and, let me say, enviable privileges, let us follow out the fundamental objects for which the Association was formed—let the

advancement of medicine and the collateral sciences be our great and prominent object, and the sound principles of pathology and therapeutics be more sought after and established than the bare amount of isolated facts; for, as the father of English physic has said, "*Etenim in eo præcipue stat medicina practica, ut genuinas indicationes expiscari valeamus, non ut remedia excogitemus quibus illis satisfieri possit.*"

In maintaining, then, this high attitude in medical science, and promoting union and brotherly feeling among all ranks in the profession, we shall command the increasing esteem of our fellow men, and any changes in our external polity, that may be considered necessary or even expedient, will be the more easily effected. In accomplishing, moreover, as far as possible, these exalted purposes, we secure the favour of the great and good in our private spheres of life; and this Association will become not more conspicuous for ennobling science and a heaven-born profession in the eyes of the rich and the learned, than for being the means of still more diminishing human misery, and of adding to the comfort and happiness of mankind.


Honiton and Sidbury Range
Otter Hill
Sidbury
Sidbury Castle Hill
Beacon Hill
Harpford
Cor Hill
Sidford
Bulverton Hill
Salcombe Hill
Dunscombe Hill
Peak Hill
SIDMOUTH
High Peak Hill

PART II.

MEDICAL TOPOGRAPHY.

ARTICLE II.

MEDICAL TOPOGRAPHY OF SIDMOUTH,

BEING A SKETCH OF THE

MEDICO-TOPOGRAPHY, GEOLOGY, NATURAL PRODUCTIONS, AND STATISTICS, OF THAT DISTRICT.

BY J. D. JEFFERY, ESQ., SURGEON.

Of the many advantages that will accrue to medical science, and indeed to the world at large, from the existence and labours of the Provincial Medical Association, there can be none of greater prospective importance than that which will be insured by its encouragement of statistical inquiries, and by its endeavours to establish the "numerical method," as the best and only legitimate plan, adapted to the study of medicine by which the value of *facts* can be ascertained, and by which, through them, *principles* of practice can be adopted.

Although statistical investigations must be *general*, and must extend to every district in the kingdom, before any approach to correctness of knowledge

relative to the influence of climate or local peculiarities on disease can be attained; still, it appears to me, that of all the information of this nature which it is desirable to acquire, that which relates to the hygienic qualities of our coast, and the resources which it may afford to the invalid, claims our most peculiar attention, and is that which, probably, would be the first to be made practically useful by the members of the medical profession. Thus is there a great encouragement held out, to the members of the profession residing in watering places especially, to endeavour to discover and make known the many and as yet hidden resources which the climate and other peculiarities may offer for the relief or cure of particular diseases.

With the above impression the author is induced to offer this paper on the "Medical Topography of Sidmouth," to the Provincial Medical Association, as a humble contribution to its accumulating stock of knowledge. For the tables of temperature he is indebted to the kindness of the Rev. N. S. Heineken ;* for assistance in the geological department, as well as for the map, he has to acknowledge his obligation to P. O. Hutchinson, Esq.

PHYSIOGNOMY OF SIDMOUTH AND ITS NEIGHBOURHOOD.

The physiognomical features of the whole of Devonshire are proverbially peculiar. Whether from its geographical position with reference to the island in general, or to its situation between the

* The Rev. N. S. Heineken is the brother of the late Dr. Heineken, of Madeira, who furnished the meteorological tables for that place, given in Sir James Clark's work on "Climate."

British and Bristol channels, or whether from the nature of its soil, it perhaps may be difficult to say, but diluvial traces and effects, both ancient and modern, are the distinguishing characteristics of this county. Hill and dale, it is well known, are words truly significant of the character of the face of the country, and, indeed, it presents throughout a general undulating surface.

But the hills and dales of Devonshire are as peculiar as they are proverbial; its hills are not, with few exceptions (such as Dartmoor and Exmoor), the stony barren wastes which the lofty eminences in most counties and countries present. Here, for the most part, the plough and the harrow have passed over them; and the hoarse croak of the raven, or bleating of the solitary sheep-fold, give place at each returning season to the sound of the reaper's note and the joyful harvest home.

The hills of the south-western coast of Devon are peculiarly remarked for their *roundness* in numerous instances, presenting the appearance of immense cairns or tumuli; and for the *smoothness* and *parallelism* of their summits in others, seeming, when viewed from a distance, as large and lofty embankments, artificially thrown up, for many miles in extent. This is a feature which has very much to do with the protective nature of the country in a climateric point of view.

The valleys likewise have their distinguishing peculiarities: they are not exceedingly deep or immensely extensive excavations on the earth's surface; not deep ravines, with cataractic waterfalls—the comparative lowness of the hills, and

their proximity to each other, as well as their variety and almost eccentricity of position, prevent this—but they may be described as smooth, sweeping depressions of more or less extent, highly cultivated, and in season, full of verdure.

The number of hills gives to Devonshire its equivalent number of streams. These streams, in some instances, from the communication of the valleys, unite and form rivers of navigable capability, but the rivers of Devon are generally small; in others, they find their way to the ocean as small rivulets, quietly, yet effectively, contributing to the fertility of the soil; and adding by their tortuous and silvery paths, much to the general effects of the beautiful scenery around.

Tracing the more important streams from east to west, they are the Tamar and Tavy, terminating at Plymouth; the Dart, at Dartmouth; the Teign, at Teignmouth; the Exe, at Exmouth; the Otter, at Budleigh Salterton; the Sid, at Sidmouth; and the Axe, at Axmouth and Seaton.

With this brief description the stranger may, probably, be enabled to form something like a correct idea of the general appearance of the southern coast of Devon. The numerous hills above mentioned must, of course, as they happen to approach the ocean, have their terminations; and thus it is that the coast presents, as viewed from the sea, a series of indentations, or openings, more or less extensive.

In the lesser of these openings, or valleys, no habitation, save a solitary farm-house, the occupier of which tills his sloping fields on right and left,

or the whitened walls of some preventive station, appears; whilst in those which are more extensive, towns and villages are situated.

The physiognomical character of the vale of the Sid presents to the observer a scene of the softest description. The hills on either side are lofty; their summits run horizontally to their terminations from the coast, inland. The Peak, or western hill, extending about two miles and a half from the cliff, winds, towards the east, and terminates in a rounded extremity; which, with another high and rounded elevation, termed *Cor Hill*, shelter in a great degree that side of the valley from the north wind. The Salcombe, or eastern hill, after running about the same distance as the former, and in a parallel line, turns off at almost a right angle eastward, and is conjoined to or confounded with the termination of a range of other hills, extending coastwise, and over which the road to Lyme runs; the intermediate space between the termination of the Peak and *Cor Hill* on the west, and that of Salcombe on the east, being occupied, at about a mile further north, by an elevated tract of country called the *Sidbury* and *Honiton* range.* Thus the vale of the Sid may be said to be *completely* shut in from the direct east and west, and from the north wind on its north-western side, and almost completely on its north-eastern side, whilst it is entirely open to the south. It may be added, also, that from the luxuriance of vegetation which abounds, and more particularly the great number of rich and lofty elm trees which

* The boundaries of the valley of the Sid are correctly given in the accompanying map.

stand in every direction, sufficient and absolute shelter may be obtained in any direction.

GENERAL DESCRIPTION.

At a distance of three miles from the sea, and immediately under the Honiton and Sidbury range, lies the pleasing and picturesque village of Sidbury, the parish of which contains 1,771 inhabitants, in and about which many highly respectable families reside, and form within themselves a cheerful society. Sidbury, from its situation inland, with respect to Sidmouth, is often the resort of invalids from the latter place, where the softness of scenery and the tranquillity of situation, conjoined to an atmosphere rather more bracing, offer advantages both congenial and beneficial to many. About a mile in advance towards the sea there is another smaller village named Sidford; this is principally inhabited by the lower and middle classes; there are few houses calculated for those of a superior order. About two miles from Sidford, in a directly southern direction, lies the town of Sidmouth, of which more particularly we have to treat. It occupies the gorge of a deep valley, which has been before noticed as the vale of the *Sid;* to its position with respect to which river, or rather streamlet, it owes its name. It is situated on the south-western coast of Devonshire, facing that large bay which extends from the Bill of Portland on the east to Bury Head on the west, in lat. 50.40 north, and long. 2.11 east, being ten miles east of Exmouth, sixteen south of Exeter, and nine of Honiton, formerly a small fishing village; it has gradually increased both in size

and importance until the present time, when it claims the title of being one of the many fashionable watering places with which the coast abounds.

The following may, perhaps, be a sufficiently accurate description of the town for our present purpose. The approach by the main Exeter and Honiton road is lined on each side, for about *a mile* from the sea, by houses, consisting, on the outskirts of the town, chiefly of cottagers' dwellings, and towards the interior, by the abodes of many of the respectable inhabitants and shopkeepers. The main street branches off at midway into two, the one leading to the market place and church, and the other to the sea. The face of the town occupies, from the preventive station on the eastern side to the extreme cottages on the western, a space of about half a mile. The houses composing the line are chiefly lodging houses, including a large hotel and boarding house; subscription, reading, and billiard rooms; a handsome terrace, situated further back, having the cricket ground before it, named the Fort-field Terrace; and a row of houses, named Clifton Place, occupying an elevated position on the western side of the town, close to the sea. The lower and working classes chiefly reside in two rather closely-populated districts of the town; the one named the Western Town, situated immediately behind the centre of a line of houses which faces the sea, principally inhabited by fishermen; the other, from its having been built on a portion of ground which is now and then partially flooded by the Sid at its mouth, is called the Marsh. The greater number of poor persons reside here, as also do num-

bers of females who gain their livelihood as laundresses.

The population of Sidmouth, and the number of houses, according to the last census, is as follows:—Inhabited houses, 634; uninhabited, 77; building, 4—total, 715. Number of males, 1,417; females, 1,892—total, 3,309. Population for 1831, 3,126; for 1841, 3,309. The reason of the number of uninhabited houses being so great, arises from the fact that the census was taken in the month of June, a season in which the number of visiters is not very great.

The town of Sidmouth, like all other places which are not of modern date, is irregularly built; but its chief claim to beauty and to its character as a resort for the invalid, apart from its climate, resides in the numerous cottages and rural abodes with which its neighbourhood abounds. Partly indebted to architectural taste, but mainly, I conceive, to local peculiarity, it happens that Sidmouth is particularly noted for the number and beauty of its cottages and villas. Most of the residences command extensive views of the sea and scenery around; and nestled, as it were, among the trees and shrubs, all that peacefulness and protection exists about them which is so very desirable and is so beneficial to those, the delicacy of whose constitution renders these attributes necessary.

The places of worship are the parish church, All Saints' church, or an episcopal chapel of ease; also an Independent, Unitarian, and Wesleyan chapel; and rooms wherein the Society of Brethren celebrate divine service.

The only medical institution is a dispensary, which is conducted partly on the self-supporting principle—ordinary subscriptions being collected from the members, and honorary ones from the rich; the whole forming a fund, a portion of which goes to pay the cost of drugs, and the remainder is annually divided among the three ordinary medical attendants. The medicines are dispensed by the three resident chemists, according to a certain contract, each holding the office for a month alternately, the members taking their prescriptions to them. The medical attendants are consulted at their own houses between appointed hours in the morning, when also intimation is given (except in cases of sudden illness), if a patient requires to be visited at home. The pecuniary department is managed by a secretary and collector, who supplies the members with cards, which are arranged in a manner which shows at once that the possessor belongs to the institution, and has paid his subscription. The members consist of those persons and their families who are not receiving parish relief, but who are too poor to pay a medical attendant in the usual way. A case book is kept at a room accessible to the medical officers, in which all the cases are entered. The whole is superintended by a committee, consisting of a number of the resident gentry of the place, who meet quarterly, and a treasurer. This institution has existed six years, and is now in a flourishing state.

There is no manufactory here; of the working portion of the population some are employed in the common and different callings of trade and labour,

whilst others subsist entirely on the proceeds of fishing and the hire of pleasure boats during the season. The poor, generally, are a moderately healthy and tolerably well-doing race; those of them who follow the fishing trade are distinguished for robustness of form and feature, and they and their families present most of those qualities of quietness of demeanour and healthiness of aspect, which mark more peculiarly the Devonshire character.

In natural productions this neighbourhood affords nothing very peculiar. Plenty of all sorts of ordinary food abounds; wheat, barley, and oats, are almost the only kinds of grain seen here; the ground is very productive of all kinds of vegetables. Of fish there is a tolerable supply. Game is not plentiful in this immediate district. The river Otter, four miles distant, and Sid stream, abound with trout.

The coast generally may be said to be shingle bound; at low water sandy slopes are disclosed, on which the visitor may walk for a long distance. The facilities for sea bathing are as good as the nature of the coast will allow, and those who choose to enjoy this luxury, *sub aperto cœlo*, will find ample space and opportunity under the cliffs on either side.

GEOLOGY.

A knowledge of the geological character of a district situated on the coast is generally easily acquired, from the circumstance that the cliffs which for the most part, bound it present fair and extensive sections of their component parts. This is peculiarly the case at Sidmouth and the southern

coast of Devon ; the springs and the rivers manifest their doings from within, and the sea its never-ceasing action from without, the whole comprising what may be termed a working model of much that is so interesting and eventful in that new study of primeval changes, long since taken place—geology.

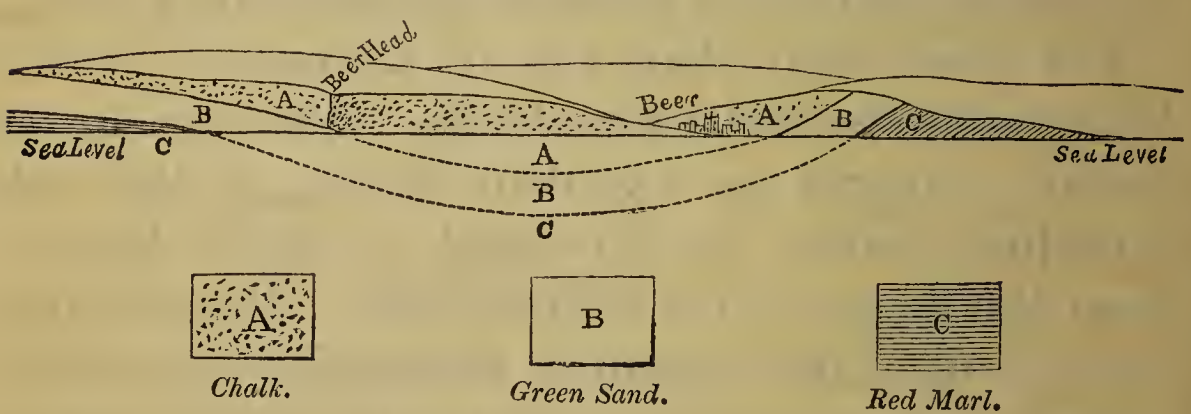
The more elevated cliffs on the Sidmouth coast are seen to be composed of three stratas, viz. : first, at the base is the new red sandstone which occupies about two-thirds of the whole elevation ; second, there is the green sand formation ; flints and plastic clay compose the summits.

The new red sandstone formation, or that which is the most abundantly developed in the Sidmouth cliffs, makes its first appearance on this coast, abutting against and resting upon the limestone slate and trap rocks in the vicinity of Mary Church, Babbicombe, and Torquay. It thence extends uninterruptedly in an easterly direction along the shore as far as Culverhole Point, now devastated by the recent land slip, a distance of about thirty miles. "The coast from Petit-Tor to Culverhole Point, between Seaton and Lyme Regis," observes De la Beche, "affords an excellent section of the red sandstone series, as developed in south Devon, from the lowest to the highest beds. Towards the lower parts of this formation, the debris of the older rocks, of which the whole principally consists, presents a coarse, gravelly, and heterogeneous appearance, mingled with fragments of every possible size, some of them being even several tons in weight; but as we ascend, these large masses are lost sight

of and are succeeded by sand more or less fine; and lastly, still higher, or in an easterly direction, by a series of beds of clay. These beds of clay are not always of the same deep red colour, but often present seams of buff, orange, and yellow, as may be seen in cuttings on the road between Exeter and Starcross, and also on the road between Chudleigh and Newton Abbott. Detached masses of a fine white sand are at times laid bare in the escarpments of the Sidmouth cliffs. This sand is collected by the poor inhabitants, and used for whitening kitchen floors, &c.

Approaching towards Beer Head, and just after passing the opening of the valley of Branscombe, known as Branscombe Mouth, the red marl suddenly dips beneath the sea level, being succeeded by the green sand and chalk. This, however, is not its last appearance, for it rises again near Seaton, and continues on to the landslip, where it again slips down and is lost sight of entirely.

SECTION AT BEER HEAD.



This depression in the strata is remarkable and interesting in a geological point of view, and much attention has been drawn to the spot. There are two theories which have been put forth to account

for this curious fact: one supposes that it may have been brought about by a sinking of the subjacent formations at that place, causing them to fall down as it were in a trough; whilst the other contends that a basin might have originally existed there, into which the superincumbent deposits were drifted at the period of their accumulation. From the regularity of the seams and beds running through, the former theory is perhaps the most tenable.

It is worthy of remark, that the poikilitic series in this county is devoid of fossil remains; although both the stratum beneath it (the magnesien limestone), and that above (the blue lias), are profusely charged with them. A few pieces of petrified wood and fish scales have been detected in its upper beds, near the landslip, about fourteen miles east of Sidmouth, approaching to the lias, and indications of certain saurians, as the Palæosaurus and the Thecodontosaurus, have been found in its lower beds, near the magnesio-calcareous conglomerate; but these specimens belong rather to the two other rocks near which they appear, and do not disprove the above assertion.

Incumbent on the red marl at Sidmouth we have the green sand formation, instead of the lias, which, according to regular geological succession in the strata upwards we ought to have had; several are therefore entirely wanting which should have intervened between these two here presenting themselves in juxta position; such facts, however, are of constant occurrence, and are consequently familiar to every geologist.

In some instances, the green sand in this neighbourhood is again succeeded by traces of chalk, although these do not become thoroughly developed until we proceed a few miles further eastward to Beer Head.

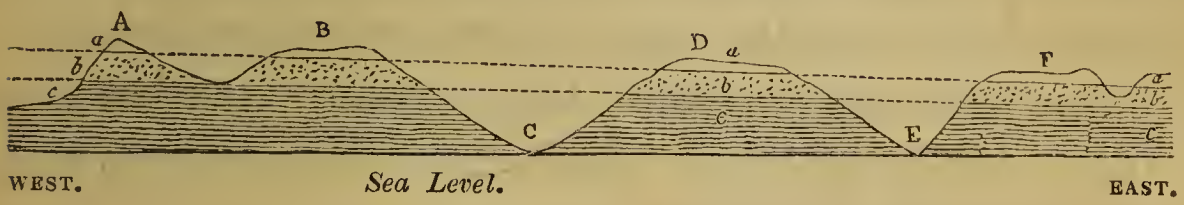
The hills immediately around Sidmouth are capped, not with actual chalk, but with flints, the remains of the chalk that once existed there; and these flints are imbedded in a tough yellow clay, the remains, probably, of the plastic clay lying still higher.

Outlying patches of green sand are found on many of the high lands, much farther west in the county of Devon; it makes its appearance near Newton Bushel, even in the low ground, and there is a remarkable portion lying a few miles south of Bideford; this remote patch, being no less than thirty-six miles from Haldon, and forty-three from Black Down, is particularly deserving of notice in a geological point of view, as going to prove that the whole of the interval between it and the eastern side of the county was at one time entirely covered by a regular and continuous stratum, though it has now almost totally disappeared, and the red marl on which it rested, is laid bare. The valley of Sidmouth, as well as those in its neighbourhood, has undoubtedly been formed by diluvial agency. The summits of the hills were, at one time, evidently united so as to form one level plane.

The subjoined diagram exhibits a view of the Sidmouth Cliffs as seen from the sea. The different strata are here seen lying one above another, and they correspond exactly with each other

on the top of every hill, making it evident that all these detached portions must, at one time, have been united before the several valleys were excavated.

SECTION OF THE HILLS FACING THE SEA AT SIDMOUTH.



a	*Flints, Plastic Clay, and Chalk.*	A. *High Peak Hill.*	D. *Salcombe Hill.*
b	*Green Sand.*	B. *Peak Hill*	E. *Salcombe Mouth.*
c	*Red Marl.*	C. *Valley of Sidmouth.*	F. *Dunscombe Hill.*

The summits of all the high ranges of land in this neighbourhood rise nearly to the same elevation, so that, when standing on one of them and looking in a horizontal direction, they seem almost as one continued plane.

The surface and soil of the valley of Sidmouth is composed, at its lowest part, of river gravel mixed with sand and earth ; higher up, or midway, of marl and earth ; and on the sides and summits of the hills, it is principally made up of yellow clay, sand, and flints. Fair crops of wheat and turnips are produced on the highest elevation of the Peak Hill ; I may also mention, that the earliest wheat, potatoes, and strawberries, are obtained from small patches of ground which are cultivated on the steep sides of the cliffs.

The encroachment of the sea and the loss of land

have been, within the last century, very considerable at Sidmouth. The cliffs, from their soft and yielding composition, are readily abraded by the sea, and also by the land springs; and hence it is, that vast quantities, of many tons in weight, frequently fall from their escarpments down to the beach. So great has been the destruction on the western side of the town, that, within the memory of man, cultivated fields extended where now the sea rolls over sunken reefs of rocks.

There being no stone quarries in the valley, the houses are, for the most part, built of red brick, made of the clay of the neighbourhood; the poorer cottages are built of cob, *id est*, clayey mud mixed with straw, and sometimes a little lime. The two churches are built of a siliceous sandstone, procured at Salcombe Valley, a mile and a half east. The best lime for building purposes is brought by water from Babbicombe, unburnt; but an inferior quality, calcined, from the chalk rocks of Branscombe and Dunscombe, is much used. The quarries at Beer furnish a fine-grained and white freestone, advantageously used for architectural mouldings. Much gypsum is collected at the base of the Salcombe and Dunscombe hills, where thin beds are seen running through the red marl and projecting from it.

The Sidmouth beach has been long celebrated for the beautiful and even precious stones which have been, and are still picked up by the water side. The chalk and green sand contain many beautifully coloured pieces of flint and chalcedony, which fall and are found on the beach. "Portions of this mineral," says de la Beche, "when worked into

seals, cannot be distinguished from the finest white cornelian, which, in fact, they are. Both such flints and chalcedony are found on the coast between Lyme Regis and Sidmouth, where also are discovered some varieties of jasper from the green sand, many specimens of which closely resemble the Egyptian pebbles, and indeed are quite as beautiful." Specimens of moss agate and fossilized wood are also numerous.

The depth of the water opposite the town, and receding from the shore in a south easterly direction, increases with much regularity. The following are the soundings :—

At	2	miles distance	.....	10	fathoms depth.
—	5	ditto	.....	15	ditto.
—	14	ditto	.....	20	ditto.
—	23	ditto	.....	30	ditto.

The sea at Sidmouth is observed to be particularly salt, a fact which is accounted for from the circumstance of there being no river of any great size emptying itself near it.

Streams and Springs.—There are several streams running in the valley of Sidmouth, the principal of which are the Cotmaton and Woolbrooke streams, and that which is termed the river Sid.

The Cotmaton and Woolbrooke rivulets are of small size; the former, arising from the base of Peak Hill, at its northern extremity, which is termed Muttlesmoor, after passing through some fields and pleasure grounds, reaches the sea on the western side of the town. The latter has its orgin in a glen called Stoford, about three miles distant. A great portion of its waters runs through the main

streets, and is conducted to the common sewer: it thus conduces much to the health and comfort of the inhabitants. The Sid takes its rise from the junction of several springs in a depression in the Honiton range, at a distance of about five miles from the coast, which is called Roncombe Valley; passing on through the villages of Sidbury and Sidford, it finally reaches the sea at that side of the town of Sidmouth which has been before designated as the Marsh. During the hot summer months it affords water scarcely more than sufficient to turn the neighbouring mill, whilst after heavy rains in the winter its size increases ten-fold, when it rushes with a fearful violence and volume incredible to those who have seen it only in its ordinary state.

No mineral waters have been detected in this locality, but there is no lack of common springs. Springs of water are found in abundance in the higher inhabited situations, on the sides of the hills at the junction of the red marl with the green sand, as also in the valley.

The water in and about the town of Sidmouth is of a pure and excellent quality, that however which is found in the wells belonging to those houses which are close to the sea, is, as is generally the case, very hard and brackish, and is not made use of for culinary purposes by the inhabitants. A company has lately been formed with the object of bringing in a supply of water to the beach from the Cotmaton Hill. This water, collected at its source from its various springs, will be brought, probably ere this is published, into the town. Its quality is peculiarly good. Dr. Shapter has kindly superin-

tended the analysis for me, and the following is his report:—"Sp. gr. 1001, contains free carbonic acid, muriate of lime, sulphate of lime, carbonate of lime, and sulphate of alumina, with a trace of iron." Dr. S. remarks, "that he has examined many of the springs in this county, and has not met with one so pure, or which contains so small a proportion of solid contents." This improvement will, in future, render the place perfectly unexceptionable as far as regards its internal arrangements. The town is lighted with gas and the Watching Act is, partially, in force.

BOTANY.

This neighbourhood is exceedingly rich in food for botanical research. The fields, woods, and copses, abound with wild plants and flowers of different descriptions; and the hedges are decked with a variety, which causes them in spring and summer to be one of the most pleasing of all the features of Devonshire scenery. The cliffs also have a class of plants peculiar to them, and their soil is found to be particularly fertile in every accessible situation. I subjoin a list of those plants which may be considered as more peculiarly belonging to this coast; botanical works will readily supply the rest:—

Adoza moschatellina,
Anagallis tenella,
Anchusa sempervirens,
Anemone nemorosa,
Anthemis nobilis,
Antirrhinum majus,
Asperula odorata,
Byronia dioica,
Betonica officinalis,
Carduus eriophorus,
Chironia centaureum,
Clematis vitalba,
Cuscuta Europea,
Drosera longifolia,
——— rotundifolia,
Echium vulgare,

Erica tralix,
Erodium moschatum,
Eupatorium cannabinum,
Euphrasia officinalis,
Fumaria claviculata,
Galanthus nivalis,
Galium verum,
Galeobdolon luteum,
Gentiana amarilla,
Geranium lucidum,
Hypericum androsæmum,
——— elodes,
——— perforatum,
——— humifusum,
Hyosciamus niger,
Linæria cymbalaria,
Lithospermum purpuro cœruleum
Lychnis viscaria,
Lysimachia nemorum,
——— nummularia,
Lythrum salicaria,
Mælva moschatus,
Melampyrum crystatum,
Menganthes trifoliata,
Myosotis scorpiodes,
Narcissus biflorus,
Narthesium ossifragum,
Œnanthe crocata,
Ononis arvensis,
Ophioglossum vulgatum,
Ophrys apifera,
——— morio,
——— lalifolio,
Orobanche major,
Pinquicula lusitanica,
Pedicularis sylvatica,
——— palustris,
Polygala vulgaris,
Primula elatior,
Ranunculus flammula,
Ruscus aculeatus,
Saponaria officinalis,
Scabiosa succisa,
——— arvensis,
Scrophularia nodosa,
Sedum Anglicum,
Silene nutans,
Solanum dulcamara,
——— nigrum,
Spirea ulmaria,
Symphytum officinale,
Vaccinium myrtillus,
Valeriana diöica,
Veronica officinalis,
——— serpyllifolia,
Vinca major,
——— minor,
Viola odorata.

The more peculiar plants found on the cliffs are :—

Chlora perfoliata,
Crambe maritima,
Crithmum maritimum,
Glacum luteum,
Statice limonium,
Asplenium trichomanes,
——— ruta muraria,
Ophioglossum vulgatum.

HORTICULTURE AND FLORICULTURE.

The gardens in this neighbourhood are well stocked and productive. There are few plants or herbs commonly used for the table which do not thrive well here ; fruit, in great variety, abounds.

The lovers of floriculture will find great scope

for the enjoyment of their taste. Flowers bloom in great luxuriance in this valley; and some of the most delicate exotics, which in many places we should find only in the green-house, are here to be seen decking the parterres on the different pleasure grounds.

The following comprise a few of those plants which have been found to do well in this valley, in the open air, during the summer and autumn :—

Azalia, varieties,
Arbutus Andrackni,
Bouvardia triphylla,
Cineraria, varieties of,
Calceolarias, ditto,
Celsia coccinia,
Cistus, varieties of,
Coronella, ditto,
Camellia japonica,
Commelina cœlestis,
Dutsea scabra,
Edwardsia microphylla,
Eschellonia rubra,
——— floribunda,
Fuchsia, varieties of,
Geraniums, all varieties,
Hydrangea, varieties of,
Heliotrope,
Jasmin,
Lantana, varieties of,
Lacestera comosa,
Mimulus, varieties of,
Malva creana,
Myrtus communis,
Punica granatum,
Photinia serulata,
Petunia, varieties of,
Papiflora Brasiliensis,
Syphocamphilis bicolor,
Salvia, varieties of,
Tournefortia helitrophoides,
Verbena, all the varieties,
Verbenum.

The myrtle attains a great size here; there are several to be seen in the Fort Fields measuring more than 20ft. in height. The Camellia japonica will live out of doors all the year round, if slightly protected during the coldest weather. In the grounds of T. L. Fish, Esq., there is a very large plant of this description, which has stood many winters; I belive it does not bloom. Many of the Fuchsia tribe live out of doors all the year; so likewise does the Verbenum, some specimens of which are to be seen of the size of large shrubs. Scarlet geraniums and some of the Salvia tribe

bear the winter climate; and both the Azalia and Magnolia thrive remarkably well.

ENTOMOLOGY.

The entomologist will find ample field for the prosecution of his science in this district. I have been kindly favoured with a list of those insects which may be considered rare or peculiar to this locality, from the extensive cabinet of my friend, Mr. Robert Miles, of Heavitree.

COLEOPTERA.	LOCALITY.
Cychrus rostratus	Harpford Wood.
Panagœus Crux-Major	River Sid.
Oedemera fulvicollis	
Scolytus destructor	
ORTHOPTERA.	
Gryllotalpa vulgaris	Cliffs.
LEPIDOPTERA.	
Abraxas Ulmata	
Acronycta Alni	
Acherontia Atropos	
Colias Edusa	
Diaphora Mendica	
Hesperia Actæon	Cliffs of Salcombe Hill.
Leucophasia Sinapis	Cliffs.
Melitæa Artemis	
Nosodonta Ziczac	
Phycita Pinguis	
Sphynx Convolvuli	
Thecla Betulæ	
Thyatyra Derasa	
Vanessa Polychloros	Elms.
Zanthia Centrago	
Zylina Petrificata	
Zeuzera Æsculi	
Hipparchia Galathea	Cliffs.
NEUROPTERA.	
Libellula quadrimaculata	
——— flaveola	River Sid.
HYMENOPTERA.	
Peltastes Necatorius	
Syre Gigas	

METEOROLOGY AND CLIMATE.

In presenting the following tables, I have only to regret that they are incomplete. The observations, as far as they go, have been taken with every care. Had Mr. Heineken entertained an idea of their being published, he would have prevented his casual absence from home from causing any interruption in his notes. Incomplete, however, as they are, I trust there will be still found a sufficient number of observations, correctly and continuously taken, to enable those who may require it, to make useful comparisons with the temperature of other places. The barometrical observations partake of the same imperfections, although in a less degree.*

* *Description and situation of Instruments.*—The barometer is a mountain one, with ivory float for levelling the surface of the mercury in the cistern. It is placed in a room seldom occupied, about 2ft. 6in. from an eastern window. The top of the cistern is 3ft. 6in. from the floor, and its elevation above low water-mark is about 25ft. or 30ft. The scale is divided by the Vernier, *nominally* into 1,000ths, *really* into 500ths. It has been compared with an excellent instrument by Adie, of Liverpool, divided by Vernier into 1,000ths, and its indications reduced to this as a standard. No corrections for temperature, &c., have been made. After the float has been adjusted, the heights of the column and of the attached thermometer have been entered as shown, allowance being made for variation from Adie's standard *only*.

The thermometers have all been carefully compared with a standard by Newman, and their readings reduced to this. Thermometer No. 1 is placed upon a detached support in the centre of an up-stairs window, (outside); its bulb is about 13ft. from the ground, but only 5ft. from the slate roof of some out-houses; its back is exposed to the west. Thermometer No. 2 is the mercurial thermometer of the register, and is read off at the same hour as No. 1, to afford a mean between the two. The register is of Rutherford's construction: it is placed in a somewhat confined yard, against a wall facing the north, at an elevation of 5ft. from the ground; it is sheltered by buildings from all direct rays of the sun, but the heat absorbed by the walls and buildings must cause its indications to be regarded only as an approximation to the temperature of Sidmouth. A comparison, however, with Nos. 1 and 2 may, in some measure, tend to reduce any error.

An Abstract of a Series of Thermometrical Observations taken at Sidmouth, by the Rev. N. S. Heineken, for one year, commencing 1st May, 1836, and ending 30th April, 1837. Note—The large figures in the Table are the monthly *Means* of the Observations, and the small figures above are the number of Observations taken in the month.

	MORNING OBSERVATIONS.																EVENING OBSERVATIONS.											
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
	30		30	30	30	30												30		30	30						
May ...	54	This Ther. was not used till the 7th Sep.	$58\frac{1}{2}$	47	30.296	$59\frac{1}{4}$	$66\frac{1}{2}$	17	$39\frac{1}{2}$	1	30.726	$62\frac{3}{4}$	15	29.396	$58\frac{3}{4}$	23	May ...	$48\frac{3}{4}$	This Ther. was not used till the 4th Sep.	30.309	$57\frac{1}{4}$	30.674	$57\frac{1}{4}$	14	29.846	53	4
	29		29	29	29	29												27		27	27						
June ...	60		61	$58\frac{1}{2}$	30.054	$61\frac{1}{4}$	$65\frac{1}{2}$	28 & 30	$51\frac{1}{2}$	12	30.412	$59\frac{1}{4}$	13	29.706	$59\frac{1}{4}$	4	June ...	$55\frac{1}{2}$		30.057	$60\frac{1}{2}$	30.426	$61\frac{1}{4}$	26	29.642	$59\frac{1}{4}$	3
	30		29	29	30	30												29		29	29						
July ...	63		$64\frac{1}{2}$	$57\frac{1}{4}$	30.160	$64\frac{3}{4}$	$70\frac{1}{2}$	5	52	31	30.595	$63\frac{1}{4}$	31	29.616	$62\frac{1}{4}$	20	July ...	$57\frac{3}{4}$		30.017	$63\frac{1}{2}$	30.508	$61\frac{1}{4}$	30	29.826	$58\frac{1}{4}$	20
	16		16	16	16	16												13		13	13						
* August.	$63\frac{1}{4}$		66	$56\frac{3}{4}$	30.337	$65\frac{3}{4}$	$69\frac{1}{2}$	16	52	2	30.974	$65\frac{1}{2}$	3	29.998	$68\frac{1}{2}$	14	August	$59\frac{3}{4}$		30.181	$64\frac{1}{2}$	30.356	$64\frac{1}{4}$	12	29.876	$64\frac{3}{4}$	3
	25	22	25	25	25	25												22	19	22	22						
Sept. ...	$56\frac{1}{2}$	$55\frac{1}{4}$	$60\frac{1}{2}$	$49\frac{3}{4}$	30.036	$59\frac{3}{4}$	66	24	42	21	30.386	$58\frac{1}{4}$	22	29.392	$60\frac{1}{4}$	6	Sept. ...	$52\frac{1}{2}$	53	30.057	59	30.486	$58\frac{1}{4}$	12	29.414	$62\frac{1}{4}$	4
	30	30	31	31	30	30												27	27	27	27						
October	$52\frac{1}{4}$	$50\frac{1}{2}$	$55\frac{1}{4}$	$45\frac{1}{2}$	29.950	$55\frac{1}{2}$	$60\frac{1}{2}$	19	26	31	30.578	55	23	29.230	56	1	October	$47\frac{1}{4}$	$48\frac{1}{4}$	29.920	$55\frac{1}{2}$	30.576	$57\frac{1}{4}$	19	29.048	$57\frac{3}{4}$	12
	29	29	30	30	29	29												28	28	28	28						
Nov. ...	45	$44\frac{1}{4}$	$51\frac{1}{4}$	$40\frac{3}{4}$	29.788	$49\frac{1}{2}$	$56\frac{1}{2}$	3	$30\frac{1}{4}$	1 & 21	30.326	45	21	28.908	55	29	Nov. ...	$46\frac{1}{4}$	$46\frac{1}{4}$	29.778	$50\frac{1}{4}$	30.238	45	20	29.216	54	28
	31	31	31	31	31	31												30	30	30	30						
Dec. ...	42	$41\frac{1}{4}$	$45\frac{3}{4}$	$38\frac{3}{4}$	29.345	$47\frac{1}{2}$	$56\frac{1}{2}$	6	27	26 & 27	30.564	$50\frac{1}{4}$	22	29.324	47	10	Dec. ...	$41\frac{1}{2}$	$41\frac{1}{4}$	30.027	$46\frac{1}{2}$	30.622	37	31	29.200	47	9
	31	31	31	31	31	31												31	31	31	31						
Jan. ...	39	39	$42\frac{3}{4}$	$34\frac{1}{2}$	30.077	$43\frac{1}{2}$	$51\frac{1}{4}$	14 & 23	25	2	30.697	37	1	29.380	45	22	Jan. ...	$38\frac{1}{4}$	$38\frac{1}{2}$	30.076	$43\frac{3}{4}$	30.656	38	2	29.498	47	22
	28	28	28	28	28	28												28	28	28	28						
Feb.	43	43	$46\frac{3}{4}$	38	30.104	47	$51\frac{1}{4}$	24	$27\frac{1}{2}$	26	30.454	$49\frac{1}{4}$	17	29.248	$49\frac{1}{4}$	11	Feb. ...	42	$42\frac{1}{2}$	30.077	47	30.424	46	3	29.238	$48\frac{1}{4}$	12
	31	31	31	31	31	31																					
March .	38	37	$42\frac{3}{4}$	$32\frac{1}{2}$	30.111	$44\frac{3}{4}$	$48\frac{1}{4}$	10	22	25	30.540	42	2	29.430	$46\frac{1}{2}$	11	March .	$35\frac{1}{2}$	36	30.144	44	30.578	43	1	29.515	$50\frac{1}{4}$	10
	30	30	30	30	30	30																					
April ...	42	$41\frac{1}{4}$	$46\frac{3}{4}$	$35\frac{1}{2}$	29.937	$47\frac{1}{2}$	$54\frac{3}{4}$	27 & 30	28	10	30.556	$48\frac{1}{4}$	8	29.504	$50\frac{1}{4}$	29	April ...	$38\frac{3}{4}$	$39\frac{1}{4}$	29.960	$46\frac{1}{2}$	30.510	45	8	29.522	51	29

* Absent from the 16th August till 4th September; the entries are the Means of the first 16 days A. M. and the first 15 days P. M. of August, and the Means of the last 27 days A. M. and P. M. of September. It may be desirable to observe that on Mr. H.'s return to Sidmouth on the 4th September, the Max. and Min. were 68 and $48\frac{3}{4}$, which of course shows the highest and lowest degrees of Heat during his absence.

An Abstract of a Series of Thermometrical Observations taken at Sidmouth, by the Rev. N. S. Heineken, for one year, commencing 1st May, 1837, and ending 30th April, 1838. Note—The large figures in the Table are the monthly *Means* of the Observations, and the small figures above show the number of Observations taken in the month.

MORNING OBSERVATIONS.																	EVENING OBSERVATIONS.										
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
	31	31	31	31	31	31												23	23	23	23						
May ...	53½	52½	57½	44	30.097	56¾	69½	18	36	10	30.514	60¼	17	29.752	52	9	May ...	46½	48½	30.114	54	30.527	56	16	29.776	50¼	9
	30	30	30	30	30	30												28	28	28	28						
June ...	60½	59¾	64½	52	30.127	61⅝	75¾	26	45¼	5	30.476	65½	23	29.448	63¾	22	June ...	54½	56¼	30.173	60½	30.476	61¾	22	29.654	56½	9
	31	31	31	31	31	31												24	24	24	24						
July ...	65½	64¾	72½	56½	30.165	65	75½	1	45¼	2	30.436	64¾	2	29.416	66½	29	July ...	58¾	61	30.043	64¾	30.436	62¾	1	29.026	67½	14
	30	30	30	30	30	30												27	27	27	27						
August	62½	61¾	67¼	55¾	30.116	65	74½	16 & 17	43	31	30.456	64¾	8	29.584	62¾	31	August	58	59¼	30.072	64	30.456	64¼	7	29.474	60¼	31
	30	30	30	30	30	30												20	20	20	20						
Sept. ...	57¾	57½	63	52¼	30.037	61¾	67	22	43	1 & 12	30.432	62¼	25	29.562	62¼	1	Sept. ...	55¾	55¾	29.986	60½	30.422	59¼	25	29.366	59¾	13
	31	31	31	31	31	31												24	24	24	24						
October	54	52½	58¼	47	30.277	57½	64½	2, 4, & 9	36	16	30.816	58¾	14	29.518	53	30	October	49½	50¼	30.272	56¼	30.814	56	14	29.464	52	28
	30	30	30	30	30	30												22	22	22	22						
Nov. ...	45¾	44¼	53	39¼	30.053	50½	57¼	11	30¾	16	30.530	52½	7	29.194	53	1	Nov. ...	44	44¼	30.021	51	30.526	52½	7	29.236	53	1
	31	31	31	31	31	31												25	25	25	25						
Dec. ...	44¼	43½	47	40	30.063	48½	54¼	20	28	13	30.572	47	4	29.472	52	18	Dec. ...	40¼	40	30.085	45	30.556	46½	4	29.556	51¼	17
	31	31	31	31	31	31												22	22	22	22						
Jan. ...	33½	32¾	40¾	28¾	29.971	40¼	50¼	1	16	19	30.458	42½	8	29.376	37	27	Jan. ...	32	32¼	30.012	42½	30.446	37	12	29.410	37	27
	28	28	28	28	28	28												22	22	22	22						
Feb. ...	36½	36	39½	33	29.634	41½	47¼	22	21½	12	30.498	40	2	28.643	47	25	Feb. ...	35½	35¾	29.689	41½	30.540	39	2	28.652	46½	24
	31	31	31	31	31	31												26	26	26	26						
March .	44¾	42½	47¾	38	29.948	48¼	58	29	29	24	30.646	52	29	29.042	47	4	March .	41	41¼	29.960	47½	30.638	50¾	29	29.144	47½	1
	30	30	30	30	30	30												27	27	27	27						
April ...	45½	44¾	50½	39½	29.962	51¾	57¾	7	31¾	20	30.426	55	12	29.162	48¾	22	April ...	42¼	43	29.947	49¾	30.580	52½	12	29.380	48¼	23

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MORNING OBSERVATIONS.																	EVENING OBSERVATIONS.											
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
	31	31	31	31	31	31												26	26	26	26						
May ...	54¾	53¼	58¾	47	30.006	58¼	74½	9	37	16	30.498	62¼	11	29.572	54	20	May ...	50⅓	51	30.304	56½	30.492	59¼	10	29.662	57¼	28
	29	29	29	29	29	29												25	25	25	25						
June ...	59¾	58½	62¼	51	29.999	60½	69¼	24	42	9	30.434	61¾	8	29.642	59¾	11	June ...	53½	54¾	30.011	60¼	30.410	58¼	8	29.626	58¼	10
	31	31	31	31	31	31												22	22	22	22						
July ...	63	61½	66¼	55	30.182	67¼	70½	20	46¾	31	30.414	67½	19	29.724	62½	29	July ...	57	58½	30.150	62½	30.374	61¼	16	29.690	61¾	14
	31	31	31	31	31	31												29	29	29	29						
August.	62¾	61½	65¾	55	30.092	64	71¼	28	47	31	30.408	64¾	14	29.402	63¼	22	August	57½	58¾	30.070	63¼	30.378	64¼	13	29.516	58½	22
	27	27	27	27	27	27												20	20	20	20						
Sept. ...	58¼	56½	62½	49½	30.113	61	66½	3	42	11	30.686	60¼	11	29.348	65¼	6	Sept. ...	53½	54½	30.135	60½	30.848	57¾	11	29.350	63¾	6
	31	31	31	31	31	31												23	23	23	23						
October	53¼	51¾	57½	48¼	30.149	56¼	63¾	1	33¼	14	30.556	56	7	29.512	56½	17	October	50¾	51¼	30.157	57	30.776	60¾	23	29.130	56	28
	30	30	30	30	30	30												28	28	28	28						
Nov. ...	44¼	43¼	47½	39¼	29.638	53½	56	8	31¾	11 & 25	30.536	56	13	28.656	53	29	Nov. ...	43	43	29.760	56¾	30.484	56	12	29.112	52	4
	17	17	17	17	17	17												16	16	16	16						
Dec. * ...	43	42	47	38	30.239	49	54¼	2	28	10	30.456	49½	8	29.562	53¾	3	Dec. ...	41¼	41½	30.239	47½	30.546	43¾	8	29.440	54½	1
	19	19	19	19	19	19												19	19	19	19						
Jan. ...	38	37	43½	32	30.157	46¼	52	14	26	13, 18, & 19	30.732	45	24	29.488	41½	30	Jan. ...	37	37	30.150	49¾	30.578	50	23	29.372	43½	29
	28	28	28	28	28	28												24	24	24	24						
Feb. ...	42	40¾	45¾	36½	30.134	46¼	52	24	28	1	30.640	50	13	29.474	44	20	Feb. ...	42	42	30.090	50¼	30.624	51	10	29.412	44	19
	31	31	31	31	31	31												25	25	25	25						
March .	43½	42¼	46½	38	29.930	48¼	52¼	25	25	7	30.230	47½	5	29.426	49¾	16	March .	41	41¼	29.911	48¾	30.206	43	10	29.480	49¾	16
	30	30	30	30	30	30												28	28	28	28						
April ...	47½	46	50½	40	30.201	51	61	30	31¼	7	30.612	49¼	11	29.560	50	1	April ...	43¼	44	30.208	50¼	30.576	46½	10	29.526	49¾	16

* From home from the 17th December till the 13th January; consequently the Means entered are those of the first 17 days A. M. and the first 10 days P. M. of December, and the last 19 days A. M. and P. M. of January. The highest Max. and Min. on Mr. Heineken's return, were 51¾ and 26.

An Abstract of a Series of Thermometrical Observations taken at Sidmouth, by the Rev. N. S. Heineken, for one year, commencing 1st May, 1839, and ending 30th April, 1840. Note—The large figures in the Table are the monthly *Means* of the Observations, and the small figures above show the number of Observations taken in the month.

MORNING OBSERVATIONS.																	EVENING OBSERVATIONS.											
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
May ...	31 $54\frac{3}{4}$	31 $54\frac{1}{4}$	31 60	31 $44\frac{1}{2}$	31 30.111	31 $59\frac{1}{2}$	$72\frac{1}{2}$	31	$31\frac{1}{4}$	16	30.884	$62\frac{1}{4}$	29	29.490	53	15	May ...	25 $47\frac{1}{2}$	25 49	25 30.067	25 56	30.344	$45\frac{1}{2}$	22	29.586	51	15
June ...	28 $60\frac{1}{2}$	28 $59\frac{3}{4}$	28 $64\frac{3}{4}$	28 $53\frac{1}{2}$	28 30.034	28 $62\frac{1}{4}$	$74\frac{1}{4}$	1	$46\frac{3}{4}$	10	30.412	$62\frac{1}{4}$	11	29.564	$61\frac{1}{4}$	22	June ...	23 $55\frac{1}{4}$	23 $56\frac{1}{4}$	23 30.009	23 $60\frac{1}{4}$	30.420	$61\frac{1}{4}$	11	29.486	$60\frac{1}{4}$	22
July ...	31 $61\frac{3}{4}$	31 $61\frac{1}{4}$	31 65	31 55	31 30.008	31 63	$72\frac{1}{4}$	5	$44\frac{3}{4}$	1	30.478	$63\frac{1}{4}$	2	29.362	$63\frac{1}{4}$	18	July ...	21 $56\frac{1}{2}$	21 58	21 30.050	21 62	30.472	$58\frac{1}{4}$	1	29.470	$60\frac{3}{4}$	30
August	30 62	30 $60\frac{3}{4}$	30 66	30 54	30 30.142	30 64	$69\frac{1}{2}$	4	43	21	30.514	67	5	29.562	$61\frac{3}{4}$	31	August	20 $57\frac{1}{2}$	20 $58\frac{1}{4}$	20 30.063	20 $62\frac{1}{2}$	30.500	$63\frac{3}{4}$	4	29.202	$62\frac{3}{4}$	31
Sept. * ...	16 $59\frac{1}{2}$	17 58	17 62	17 $53\frac{3}{4}$	17 29.760	17 $61\frac{1}{2}$	$65\frac{1}{2}$	11	43	13	30.174	$62\frac{3}{4}$	10	29.170	$60\frac{1}{4}$	14	Sept. ...	12 $57\frac{1}{4}$	12 $58\frac{1}{4}$	12 29.799	12 62	30.208	$63\frac{3}{4}$	10	29.140	$61\frac{1}{4}$	14
October																	October										
Nov. ...																	Nov. ...										
Dec. ...																	Dec. ...										
Jan. ...	26 $44\frac{1}{4}$	26 $43\frac{1}{2}$	26 $48\frac{3}{4}$	26 39	26 29.892	26 49	$53\frac{1}{4}$	20 & 21	24	12	30.380	$43\frac{1}{2}$	12	29.344	52	24	Jan. ...	19 $45\frac{1}{2}$	19 $45\frac{1}{4}$	19 29.805	19 $50\frac{1}{4}$	30.158	$48\frac{3}{4}$	14	29.198	$50\frac{1}{4}$	24
Feb. ...	28 40	27 $39\frac{1}{4}$	26 44	28 $35\frac{3}{4}$	28 29.997	28 $46\frac{1}{2}$	53	8	$27\frac{1}{4}$	23	30.666	43	26	28.338	$50\frac{1}{4}$	4	Feb. ...	19 $38\frac{3}{4}$	19 39	19 30.009	19 $46\frac{1}{2}$	30.654	43	25	28.794	$49\frac{3}{4}$	3
March .	31 41	31 $39\frac{1}{2}$	30 $46\frac{1}{2}$	31 $34\frac{3}{4}$	31 30.391	31 $46\frac{1}{4}$	$55\frac{3}{4}$	11	$27\frac{3}{4}$	26	30.774	46	9	29.926	45	29	March .	23 38	23 39	23 30.339	23 $43\frac{3}{4}$	30.692	45	7	29.930	46	29
April ...	30 52	30 51	30 $56\frac{3}{4}$	30 $42\frac{3}{4}$	30 30.161	30 $55\frac{1}{2}$	$69\frac{3}{4}$	28	$36\frac{1}{2}$	16	30.538	$51\frac{1}{2}$	10	29.682	$50\frac{1}{4}$	7	April ...	25 $46\frac{1}{2}$	25 47	25 30.179	25 53	30.464	$57\frac{1}{4}$	22	29.642	$48\frac{1}{4}$	1

* Absent from 17th September till 2nd January; on returning, the highest Max. and lowest Min. were found to be 53 and $46\frac{1}{2}$.

An Abstract of a Series of Thermometrical Observations taken at Sidmouth, by the Rev. N. S. Heineken, for one year, commencing 1st May, 1840, and ending 30th April, 1841. Note—The large figures in the Table are the monthly *Means* of the Observations, and the small figures above show the number of Observations taken in the month.

MORNING OBSERVATIONS.																	EVENING OBSERVATIONS.										
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
	31	31	31	31	31	31												24	24	24	24						
May ...	57	57	59	49½	30.024	60	69	1	41	2	30.538	63¼	30	29.516	58¾	10	May ...	52	53	30.023	57¾	30.516	57¼	22	29.482	56½	16
	28	28	28	28	28	28												26	26	26	26						
June ...	61¼	61¼	66¼	53	30.187	63¾	72	29	44¾	26	30.366	62¼	4	29.880	64¼	23	June ...	55	56½	30.190	61	30.388	59¼	3	29.844	59¾	23
	30	30	30	30	30	30												19	18	19	19						
July ...	61	61½	66¼	53½	30.069	63¾	72½	31	44¾	26	30.442	64¾	14	29.664	64¼	20	July ...	55¼	56½	30.039	62	30.474	63¼	14	29.656	62¼	19
	27	27	27	27	27	27												16	17	17	17						
August *	63¼	63¾	69½	55½	30.066	67	77¾	9	48	24	30.428	71½	9	29.394	65¼	17	August	57¾	59	30.090	64¼	30.386	57¼	9	29.570	61¾	17
Sept. ...																	Sept. ...										
October																	October										
Nov. ...																	Nov. ...										
Dec. ...																	Dec. ...										
	31	31	31	31	31	31												14	14	14	14						
Jan. ...	37½	37	41¾	33	29.945	42¼	50½	17	17½	8	30.650	41	21	29.150	43½	4	Jan. ...	37	37	29.902	42¾	30.450	41½	20	29.276	45	3
	28	28	28	28	28	27												18	18	18	18						
Feb. ...	36¾	36¼	40¼	32½	29.880	43½	48¾	14	19	3 & 4	30.528	46	24	29.070	36½	10	Feb. ...	34¼	34¼	29.776	41	30.472	45	21	29.080	46	14
	29	29	26	26	26	26												16	16	9	9						
March .	47	46	50¼	40¼	30.080	51	55¼	8	33¼	4	30.574	50½	10	29.466	53	22	March .	45	45¼	30.131	49¾	30.494	49¼	13	29.442	50¼	21
	30	30	27	27	27	27												28	28	15	15						
April ...	49¼	48¼	53¼	41	30.010	54¼	68	30	35	4 & 16	30.244	58¾	27 &28	29.452	54	5	April ...	44¾	45½	29.999	51½	30.274	48¾	13	29.434	49¼	4

* Absent from 27th August till 1st January; on returning, the Max. and Min. were 44 and 35¼.

An Abstract of a successive Series of Thermometrical Observations taken at Sidmouth, by the Rev. N. S. Heineken, for one year, commencing 1st May, 1841, and ending 30th April, 1842. Note—The large figures in the Table are the monthly *Means* of the Observations, and the small figures above show the number of Observations taken in the month.

	MORNING OBSERVATIONS.																EVENING OBSERVATIONS.										
A. M. 9	Ther. 1.	Ther. 2.	Max.	Min.	Bar.	Att. Ther.	Highest Max.	Day.	Lowest Min.	Day.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.	P. M. 10	Ther. 1.	Ther. 2.	Bar.	Att. Ther.	Max. Bar.	Att. Ther.	Day.	Min. Bar.	Att. Ther.	Day.
	29	29	25	25	25	25												30	30	18	18						
May ...	56¼	56	61¾	42	30.001	61	75¼	27	41	9	30.492	61¼	13	29.382	57¼	19	May ...	53	53½	29.992	57¾	30.446	57½	12	29.554	56¾	4
	29	29	28	28	28	28												29	29	23	23						
June ...	59¾	59¾	64¾	50½	30.131	63	69½	15	42	13	30.884	62¼	18	29.552	63¼	25	June ...	53	55	30.095	59¾	30.898	60¼	10	29.374	61¼	14
	30	30	28	28	29	29												29	29	21	21						
July ...	61½	61¼	66¼	53	30.054	64	71½	3 & 6	44	15	30.334	65¼	2	29.716	63¼	20	July ...	55½	56¾	30.025	61	30.346	64¼	2	29.520	60¾	10
	31	31	25	25	25	25												28	29	9	9						
August	61¾	61¾	66¼	55¼	30.026	64¼	73½	27	48	24	30.460	68½	27	29.034	64¼	6	August	57¼	58	29.991	60¾	30.384	59¼	24	29.652	61¼	10
	11	11	11	11	11	11												10	10	5	5						
Sept. * ...	58¼	58½	62	51¾	29.981	62	65½	11	44	7	30.200	63¼	11	29.756	59¼	7	Sept. ...	54¼	55	29.958	60¼	30.184	62¾	10	29.694	59¼	3
	26	26	26	26	26	26												23	23	15	15						
October	51¼	50¼	55½	46¼	29.820	56½	70	6	34¼	22	30.190	52	22	28.944	56½	6	October	48½	49	29.970	54¼	30.052	56½	15	29.056	56½	6
	29	29	30	30	30	30												28	28	21	21						
Nov. ...	46	45¼	49½	41	29.895	51	55	12	29	15	30.554	54½	7	29.000	55	30	Nov. ...	44½	44¾	29.779	49¾	30.532	54	6	28.938	55	29
	30	30	31	31	31	31												31	31	17	17						
Dec. ...	43¼	42½	46¾	39	29.851	49	54¼	11	26	21	30.326	47	31	28.996	54	3	Dec. ...	42½	42¼	29.727	47	30.270	47	31	29.122	50	11
	31	15	30	31	31	31												26	26	21	21						
Jan. ...	36¾	35	39¾	32¾	30.163	43	47¼	1	24¾	9	30.636	41½	7	29.376	46	26	Jan. ...	36¼	36	30.119	42¼	30.606	38	7	29.538	44	22
	25	24	20	20	20	20												25	24	19	19						
Feb. ...	43	42¼	45¾	43	30.305	46¼	51¼	11	31¼	5	30.694	48¾	15	29.816	45	9	Feb. ...	42	42	30.027	46	30.646	48¼	14	29.802	46	9
	30	30	25	25	26	26												31	31	25	25						
March .	46	44¾	50	40¾	30.074	52	56¼	29 & 31	30½	6	30.520	52	15	29.592	51½	20	March .	45½	45¼	30.011	50¾	30.512	52	15	28.968	50¼	9
	30	30	30	30	30	30												29	29	22	22						
April ...	48¾	48	53¾	40¼	30.164	55½	66½	27	32¼	6	30.518	52½	5	29.546	53½	1	April ...	44¼	45¼	30.169	51½	30.466	48¾	4	29.684	50¼	1

* From home from 11th September till the 6th October; consequently the entries are the Means of the first 11 days A. M. and 10 days P. M. of September, and the last 26 days A. M. and P. M. of October. On returning, the Max. and Min. were 70 and 41.

The climate of the south of Devon is well known to be peculiarly mild and soft in its nature; and that of its coast has, in addition, the property of moisture derived from exhalations from the sea, which are spread over the land by the prevailing southerly winds.

Sidmouth, from its position between two high hills, which protect it completely from the direct east and west winds, and sheltered as it is from the north by the Honiton range, Cor Hill, wooded enclosures, and luxurious vegetation, must of necessity possess a climate mild, equable, and moist. The general character of the weather in the different months and seasons may be described, pretty correctly, as follows:—

Spring.—February, although usually a mild and bright month, is frequently ushered in by storms; after which the weather may be said to be cheerful, and we enjoy the first taste of spring.

Among Mr. Heineken's observations on the state of the weather during the last six years, I find three great storms mentioned as having occurred in February. One commenced on the 14th, 1838, at nine *a.m.* In the evening it blew a hurricane from the east, and continued blowing very violently through the next day. In Lind's wind-gauge a column of water of $1\frac{6}{10}$in. was supported; barometer 29.482, corrected by Adie's standard barometer. Another storm, still more violent, occurred on the 24th of the same month, which continued through the 25th. The sea dashed over the sea wall and did some damage to the beach houses; the barometer was very low, being 28.600;

attached thermometer 46½. The third storm was in 1840, commencing February 3rd, and continuing through the 4th. In this gale the tremendous violence of the sea completely destroyed the harbour works which had been commenced on the west side of the town; a large embankment, protected by a wall 6ft. thick and 17ft. high, was completely swept away; the lowest state of the barometer was 28.338, attached thermometer 50. Thus, February is seen to be sometimes stormy; but these excitements of the elements may be considered as the last struggles of expiring winter, for clear weather immediately succeeds, and the temperature rises considerably.

March.—Throughout this month north and north-east winds prevail. Severe storms are very uncommon, and the equinoctial gales rarely reach a tempestuous point.

April is, of course, showery; but in this month spring is quite established, and the valley and trees are fully decked with their delicate garments of early green and spring flowers. I noted in the last spring (1842) the appearance and progress of vegetation in the following order; it was considered a late season:—

Feb. 2.—Primroses in the hedges; crocusses and snowdrops in the gardens.
„ 3.—Hazel nut in blossom; common white hyacinth in bloom in the gardens.
„ 12.—Roses, sweetbriar, and honeysuckle, with leaves out; polyanthus, wall-flower, and periwinkle, in bloom.
„ 20.—Daisies out; almond tree and daffodil in flower.
„ 24.—Wild strawberries in blossom in the hedges.
March 3.—Hepaticas in flower.
„ 5.—Butterfly seen.
„ 7.—Peach trees in blossom.
April 30.—Elm trees in full foliage.

Summer.—The temperature of the summer months is not so high here as in more inland situations and in the larger towns. The land and sea breezes are almost constant; and at times, when the interior is close and sultry, a walk by the sea beach is cool and refreshing. Vegetation and foliage also, in a confined valley, doubtless exert no inconsiderable influence through the shading of the earth and the evaporation, absorption of caloric, and radiation of cold, peculiar to vegetables, on the general temperature.

Storms are not unfrequent in the summer months, and it is not considered extraordinary to see trading vessels anchored off the town taken by surprise by the sudden rising of a strong south wind and driven ashore. The storms in the summer are generally accompanied with more meteorological phenomena than in the winter; an aurora often precedes bad weather, and flashes of sheet-lightning are generally precursors of the coming blast. *May* is generally a genial and tranquil month; flowers bloom here in great variety, and vegetation flourishes under its auspices. In *June* and *July* we are more subject to sudden storms and sometimes to morning fogs, arising from condensed vapour on the surrounding hills. The south-west winds are the most prevalent in these months. On June 20th, 1839, the most tremendous thunder-storm ever recollected, occurred; it commenced about 25 minutes to nine *p.m.*; the lightning, forked and sheet, played without cessation; and the thunder was one continued roar like that of a heavy wind or sea, without interruption, from 30 to 35 minutes from the beginning of the storm; hailstones fell, several of which measured

$2\frac{1}{4}$ inches in circumference; skylights were broken in almost all the houses, and the land-flood inundated the lowest parts of the town; the hail and rain lasted between 40 and 50 minutes; there had been thunder, rain, and dense fogs, for several days previously. The storm came from the south-west and passed on to the north-east; the wind became calm afterwards, and the clouds were cirro-cumulous over all the sky. This storm, the papers informed us, was almost general throughout the country. On July 29th, 1837, a very heavy storm occurred, in which a column of water in Lind's gauge was sustained equal to $2\frac{2}{10}$in. On July 18th, 1839, there was a storm which continued through the next day. This year was marked by an extraordinary quantity of rain, which was general throughout the kingdom. Occasionally, in these months, the sea has been known to emit offensive odours for the space of a day or two after a calm. In July, 1837, this happened; the weather had been sultry and foggy, the water was of a yellowish colour, frothy and effervescing; the sailors said that at about a mile off, and for a considerable extent along the coast, the quantities of jelly fish were most astonishing; their expression was, that "they are like clouds." They attribute the offensive smell of the sea water to the spawn of these fish. In the *Athenæum*, No. 529, page 916, in reference to this subject, it is remarked, that a singular epidemic prevailed among the molluscous shell fish in the river Ohio; it began in April, 1836, and continued until June, destroying millions of them; the cause of this epidemic is unknown. Also, in the *Cabinet Library*, "Polar

Seas," it is remarked, that in the Arctic Seas, the (sea blubber) jelly fish affords food for fish of all sorts; myriads of the smaller tinge the water with an olive green colour, and Mr. Scoresby estimates two square miles to contain 23,888,000,000,000,000 of them.

The summer months, then, may be said to be liable to storms, which however subside sooner than those of winter, and their tendency is to clear the sky and to render serene the future weather. They are distinguished by the lightning and thunder which accompany them, and other meteorological phenomena; by the high temperature at which they occur; and by the comparative shortness of their duration. The sea breezes after a hot day render the evenings delightfully pleasant.

Autumn.—This season is undoubtedly the best, and most unobjectionable in point of climate, of any in this part. The temperature, although high at the commencement, soon undergoes a salutary change. The winds are variable during the day, shifting from south to north and from north to south; they give an invigorating principle to the climate in a manner indescribable except to those who feel it; the atmosphere is generally clear, and despite the occurrence of the autumnal equinox, there is more equality of temperature and *steadiness* of weather in this than in any other season of the year. The sea-bathing in September and October is found to be more useful and strengthening, and invalids feel a bracing influence, unaccompanied with inconvenience, which is, under almost all circumstances, not only innocuous, but beneficial.

August is not generally so hot a month as July, and scarcely ever so stormy.

September is always more or less windy towards the latter part; the equinoctial gales are the cause of this; it is, nevertheless, usually a pleasant month in this quarter.

October is of all months in the year the most agreeable, on the south coast. North winds generally prevail, the atmosphere is clear, and the sea tranquil; if the wind rises it is usually from the north. It is in this month, that invalids experience the bracing qualities of the air, at the sea-side.

Winter.—This season manifests little of its natural rigour in this sheltered situation; it is marked by the falling of more rain than snow, and is often too mild to be agreeable to those who are in robust health. Snow seldom remains on the ground more than three or four days, and frosts are rarely uncomfortably severe. It is in the autumn and winter seasons that Sidmouth should be resorted to by those who require to be protected from those extremes of cold which are felt in more inland and and northern districts; here, in a residence properly chosen, both for its *aspect* and *situation,* the invalid will not have often to complain of the severity of the weather. It is true that storms in winter occur as surely as the season, but it must be recollected that they almost invariably come from the south and south-west. These winds, having passed over the expanse of the Atlantic, bring with them an *elevation of temperature.*

November.—This month sustains its general characteristics in this part, for turbulence, uncertainty, and gloominess. The atmosphere, charged with moisture from the ocean, is frequently condensed in fogs over the land. Sometimes the weather is

more or less frosty throughout November, but it is more generally stormy. The tempest of November, 1835, which will long be remembered on this coast, raged with much violence here; the sea broke over the walk and did much damage to the town. A south-west gale occurred in November, 1838; it commenced on the 6th and continued through the 8th. On the 25th, another storm began from the south-south-east, which continued with great and unabated fury for four days; the raging of the sea was terrific, and the gusts of wind were extremely violent; many times it raised the column in the wind guage $1\frac{8}{10}$in.; the barometer, at the commencement, was 28.618, it sunk afterwards as low as 28.548; attached thermometer $52\frac{1}{2}$. The rain was excessive. In November, 1840, another storm is noticed; the lowest state of the barometer was 28.496; attached thermometer $52\frac{1}{4}$. These storms are not much felt by those who do not reside immediately fronting the sea; the temperature at which they have occurred will be seen to be high.

December. This is generally a fine month with us; it is very nearly allied to October, from the clearness of the atmosphere, and very often from the extreme mildness of the weather. Frost seldom sets in until after Christmas. It not unfrequently happens that the weather continues exceedingly mild until the end of the month, so that much change of dress is not required. I find among Mr. Heineken's remarks, the following, with reference to this month. "December 25th, 1837:—This is a remarkably fine day, and more like a settled spring day; at twelve o'clock, a thermometer exposed to the sun, stood at $62\frac{1}{2}$. The day has

been fine enough to be without fires in-doors and to have windows open. Birds singing as in spring, and large flies out, and a butterfly (the painted sort) which has been all the winter alive in my drawing-room, has, for several days, been flying about in the windows. I have noticed, in this and last month, peculiar red or rather crimson sunsets, very like aurora. Painted butterflies have been seen also in several gardens."

These remarks apply also to many Christmas days in this part. In a gale, occurring December 7th, 1840, and lasting until the next day, the state of the barometer was 29.318; attached thermometer 48. In another gale, on December 12th of the same month, the barometer stood at 29.848; attached thermometer $48\frac{1}{2}$.

December then may be said to be usually a fine clear month, subject to few atmospheric changes; the wind is mostly in the northern quarter.

January. Almost all the hard frost or snow that we ever have here occurs in this month, and the mean temperature is the lowest. Heavy gales, when the season is wet, are not unfrequent, but the wind does not in general rise so high as in November; in a gale on January 2d, 1838, the column in Lind's wind guage was 1in. In January 23rd, 1840, in a heavy gale which lasted through the 24th, with very hard rain, the barometer ranged from 29.344 to 28.980; attached thermometer, 50, 52, and 53. January is however most commonly dry and frosty; it is, as before remarked, our peculiar winter month.

With respect to the quantity of rain that falls in this neighbourhood, I have not at my command the result of observations sufficiently extensive to

show; my friend Dr. Radford has kindly furnished me with the following information:—"From observations kept during two years and a half, the quantity of rain falling at a station more than 100 feet above the level of the sea, would appear to agree very nearly with that observed at the Institution at Exeter, which, as given by Dr. Shapter, is 29in. 12. The temperature of a well at the same spot, 130ft. deep, scarcely varies from 52° during the year."

In endeavouring to draw an inference from the preceding observations on the climate of Sidmouth, with regard to its applicability to different affections and diseases, I think my experience will justify me in arriving at the following conclusions.

In all cases where disease or disorder is accompanied with a *relaxed* habit of body, with softness of muscular fibre and paleness of skin; in chronic affections of the liver, in chlorosis, anæmia, *atonic* dyspepsia, in uterine disorders, arising from debility —to these this coast cannot be said to be adapted in the summer months; in the autumn and winter they may be benefitted. This observation does not apply to convalescents from any protracted acute disease, such as fever, or from accidents, who, coming from inland, will be very likely to recruit their health in the summer; neither does it apply to weakly children, for whom sea bathing may be considered desirable. I have known persons suffering from chronic irritation and catarrh of the bladder, derive comfort in this summer climate; and also those who labour under acute inflammatory dyspepsia. Those who are subject to different and *peculiar* nervous affections, and are very sensitive to cold, live comparatively comfortable here

all the year round. Asthma, that form so called spasmodic, congestion of the lungs, hæmoptysis, and cases wherein there is great irritability of the pulmonary mucous membrane, will be likely to receive benefit at *all seasons* in the soft moist air of the south coast. For young and delicate persons, in whom a tendency to pulmonary disease is suspected, a residence here is desirable. Some forms of inflammatory rheumatism are benefitted. In some peculiar affections of the brain, also attended with *excitement*, this climate proves soothing; but those of a *melancholic* temperament should not be brought here, except in the autumn and winter.

With regard to pulmonary affections, there is much discrimination to be observed. I have previously mentioned the precautions and considerations which, in my opinion, should be the necessary accompaniments to a change of air, when prescribed for the consumptive invalid. In tuberculous cachexy, and in suspected tuberculous deposit, when the circulation is quick and the lungs sensitive to cold, a *permanent* residence on this coast, subject to the necessary and paramount auxiliaries, such as a proper choice of situation, aspect, &c., and the possession of general, mental, and bodily comforts, with judicious care, might be of essential service. Where softening of tubercle in the lung has taken place, and the patient is in the last stage of consumption, I think I have seen both comfort and life prolonged by the patient's residing *close* to the sea, even in the heat of summer, through the effects of the refreshing qualities of the sea breezes. In winter the patient should reside in one of the numerous cottages inland.

With reference to the situations in Sidmouth which are desirable for consumptive invalids, I should say that the row of houses called the *Fort Fields,* those cottages in the *Elysian Fields,* and numerous others situated in the middle of the valley, *all facing the south,* are the most desirable.

The eastern side of the town, immediately under the Salcombe Hill, possesses advantages for the consumptive invalid, which I should think could rarely be surpassed in England for warmth, protection, and beautiful scenery; but here, I am sorry to say, at present, there are few houses of which the stranger could avail himself.

MEDICAL STATISTICS AND HISTORY.

In endeavouring to give an account of those diseases which are incidental to or prevalent in this neighbourhood, I avail myself of the Dispensary registry, adopting a classification which I have thought to be both comprehensive and suitable. In treating of the different complaints, I shall speak from the relative data of the tables, aided by the results of my personal experience in the medical practice of the district.

The members of the Dispensary comprise, as before stated, the greater number of the middle class of the poor; and I should imagine, that a knowledge of the diseases affecting it, would afford a tolerably fair index of those which prevail in the others. The institution has been six years in existence, and the cases admitted during this period, amounting to 3655, are arranged according to their occurrence in each year, and their distribution in its respective months—the year commencing in August.

TABLE 1.

1836.—DISEASES.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Total.
Organs of Digestion, including Diarrhæa, Dyspepsia, Enteritis, and Gastritis	41	30	42	22	11	14	15	20	17	21	15	23	271
Organs of Respiration, including Pneumonia, Bronchitis, Pleurisy, Asthma, Pertussis, and Influenza	5	8	1	5	5	61	59	13	2	4	7	6	176
Phthisis	1	...	...	...	...	...	...	...	...	...	1	...	2
Organ of Circulation	1	1	...	...	...	...	...	...	...	...	...	...	2
Nervous System	1	2	2	1	3	...	1	...	1	3	4	1	19
Cerebral Affections	6	2	1	...	1	3	2	1	2	1	2	...	21
Simple Fever	1	5	7	4	4	2	7	2	2	1	2	...	37
Typhus Fever	...	...	1	...	1	...	...	...	1	4	...	...	7
Eruptive Fever	...	1	...	4	1	...	...	...	1	...	4	...	11
Cutaneous Disease	9	7	2	5	6	4	2	6	1	8	5	2	57
Struma	4	6	1	6	2	...	...	2	4	3	2	...	30
Rheumatism	...	2	3	4	2	3	2	3	1	1	1	1	23
Dropsy	1	...	...	...	...	...	...	...	...	...	...	...	1
Generative System	5	2	4	4	3	2	3	2	5	2	2	2	36
Urinary Organs	2	...	...	...	1	...	...	1	...	...	...	...	4
Worms	1	1	3	4	4	4	...	1	...	...	2	...	20
Bronchocele	...	...	...	2	...	...	...	...	...	1	1	...	4
Miscellaneous	16	23	16	7	22	8	5	21	11	12	16	14	171
Monthly Total	94	90	83	68	66	101	96	72	48	61	64	49	892

TABLE 2.

1837.—DISEASES.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Organs of Digestion	13	23	20	21	11	14	10	21	13	11	9	57	173
Organs of Respiration	2	1	2	1	4	6	5	5	1	6	7	4	44
Phthisis	1	1	...	...	...	...	...	...	...	1	...	...	3
Organs of Circulation	1	...	1	...	1	...	...	...	...	...	...	...	3
Nervous System	2	...	...	1	2	...	1	...	...	...	...	...	6
Cerebral Affections	1	4	3	3	...	4	6	2	1	2	2	...	28
Simple Fever	...	...	...	1	2	3	1	...	3	2	...	1	13
Typhus Fever	1	1	1	3	...	...	5	1	...	2	2	2	18
Eruptive Fever	...	3	7	6	...	2	2	1	...	...	...	...	21
Cutaneous Disease	7	8	7	8	3	4	3	2	3	3	1	3	52
Struma	1	...	...	1	1	1	1	1	...	2	...	...	8
Rheumatism	1	2	1	2	1	1	1	1	2	...	2	1	15
Dropsy	...	...	...	...	...	...	...	1	...	...	...	...	1
Generative System	2	2	1	...	1	2	2	1	1	2	2	1	17
Urinary Organs	...	1	...	1	...	...	...	...	...	1	...	...	3
Worms	...	...	...	2	...	...	1	1	2	...	...	1	7
Bronchocele	...	...	...	...	...	...	...	...	...	...	1	...	1
Miscellaneous	15	19	11	13	20	13	13	17	15	15	10	5	166
Monthly Total	47	65	54	63	46	50	51	54	41	47	36	25	579

TABLE 3.

1838.—DISEASES.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Digestive Organs	30	10	14	10	16	10	5	14	12	7	19	12	159
Respiratory Organs	5	4	1	4	2	7	5	5	3	4	8	1	49
Phthisis	...	...	1	...	1	...	...	...	...	...	...	...	2
Organs of Circulation	...	...	...	...	...	...	...	...	...	...	...	...	...
Nervous System	1	...	2	2	2	...	1	2	2	1	2	1	16
Cerebral Affections	5	2	...	...	1	2	2	...	...	1	1	1	15
Simple Fever	2	2	1	2	1	2	1	1	...	1	1	2	16
Typhus Fever	1	1	1	4	2	1	1	...	3	3	...	2	19
Eruptive Fever	...	1	1	2	...	...	...	...	...	...	1	...	5
Cutaneous Disease	2	4	2	2	8	1	...	5	3	4	4	4	39
Struma	1	...	...	...	...	1	...	1	2	1	...	...	6
Rheumatism	...	3	1	1	...	4	1	...	1	...	1	1	13
Dropsy	1	...	...	...	...	...	...	...	...	...	1	...	2
Generative System	1	1	1	...	2	...	1	1	...	1	1	1	10
Urinary Organs	...	...	...	...	...	...	...	...	...	...	1	...	1
Worms	2	...	2	...	...	1	1	...	1	...	2	...	9
Bronchocele	...	...	1	...	...	...	...	...	...	...	...	...	1
Miscellaneous	19	7	19	6	12	9	7	9	10	15	11	15	139
Monthly Total	70	35	47	33	47	38	25	38	37	38	53	40	501

TABLE 4.

1839.—DISEASES.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Digestive Organs	19	24	22	11	16	20	17	20	10	20	14	26	219
Respiratory Organs	3	3	1	5	5	4	12	7	6	7	1	2	56
Phthisis	1	...	...	...	...	...	1	...	...	...	...	...	2
Organs of Circulation	...	...	1	...	...	...	...	...	...	...	1	...	2
Nervous System	2	...	3	2	3	2	1	1	...	2	2	1	19
Cerebral Affections	2	...	2	1	1	...	1	...	2	4	3	3	19
Simple Fever	4	9	5	1	3	3	5	3	...	4	1	3	41
Typhus Fever	6	2	2	16	8	1	...	2	...	1	...	2	40
Eruptive Fever	...	...	6	29	9	...	...	...	...	2	...	2	48
Cutaneous Disease	6	1	5	2	6	3	2	1	8	4	6	4	48
Struma	1	...	...	1	...	...	1	...	...	...	...	2	5
Rheumatism	1	1	4	1	1	3	...	...	1	1	3	...	16
Dropsy	...	...	...	...	...	...	...	1	...	...	...	...	1
Generative System	1	1	1	3	...	4	1	1	...	...	...	...	12
Urinary Organs	...	...	...	...	...	1	...	...	...	...	...	...	1
Worms	...	2	...	...	...	...	2	...	...	...	...	2	6
Bronchocele	...	...	..	...	...	..	...	1	...	...	1	...	2
Miscellaneous	11	10	15	15	11	6	10	20	9	12	10	17	146
Monthly Total	57	53	67	86	63	47	53	57	36	57	42	65	683

TABLE 5.

1840.—DISEASES.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Digestive Organs	20	33	18	13	19	12	7	15	8	8	9	19	181
Respiratory Organs	...	1	1	5	11	5	1	9	3	9	7	3	55
Phthisis	...	...	...	...	...	...	...	...	...	...	...	...	...
Organs of Circulation	...	...	...	...	...	...	1	...	...	...	...	...	1
Nervous System	...	1	...	1	2	2	1	1	...	2	4	2	16
Cerebral Affections.	...	3	3	...	2	1	1	1	3	2	...	4	20
Simple Fever	...	4	1	2	...	...	4	5	2	1	...	...	19
Typhus Fever	1	...	4	1	...	...	...	1	...	...	...	...	7
Eruptive Fever	...	...	...	...	...	...	...	...	1	2	1	1	5
Cutaneous Disease	3	2	2	2	3	3	4	4	4	5	3	3	38
Struma	...	...	...	...	1	1	...	...	1	...	1	1	5
Rheumatism	2	...	1	2	1	...	2	3	2	...	1	3	17
Dropsy	...	1	...	...	...	...	...	...	...	...	...	...	1
Generative System	1	2	1	...	...	...	...	...	...	...	...	..	4
Urinary Organs	...	...	...	...	...	...	...	...	...	...	...	...	...
Worms.....	1	...	...	...	...	...	...	...	...	...	...	...	1
Bronchocele	...	...	...	...	...	..	...	...	...	...	...	...	...
Miscellaneous	15	13	15	15	13	8	11	14	15	5	5	13	142
Monthly Total	43	60	46	41	52	32	32	53	39	34	31	49	512

TABLE 6.

1841.—DISEASES.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Digestive Organs	13	11	15	6	14	10	13	9	10	16	23	22	162
Respiratory Organs	1	...	3	2	...	5	7	1		2	2	1	24
Phthisis	...	...	...	...	...	...	1	...	...	...	1	...	2
Organs of Circulation	...	...	...	...	...	...	. .	...	...	...	...	...	...
Nervous System	2	...	1	...	1	2	1	1	3	...	3	7	21
Cerebral Affections	1	1	2	...	1	1	...	...	1	1	...	1	9
Simple Fever	4	...	...	1	1	1	1	1	5	1	...	...	15
Typhus Fever	...	...	2	...	...	0	...	...	...	...	...	...	2
Eruptive Fever	...	...	3	7	12	10	1	3	...	...	...	...	36
Cutaneous Disease	11	2	4	2	3	1	5	...	6	8	5	3	50
Struma	2	...	...	...	1	1	...	...	...	...	...	...	4
Rheumatism	1	...	1	1	2	...	...	...	2	1	...	...	8
Dropsy	...	...	1	...	...	...	...	...	...	1	...	...	2
Generative System	...	...	3	1	1	...	3	...	1	...	1	5	15
Urinary Organs	...	1	1	...	1	...	...	...	...	...	...	1	4
Worms	...	...	...	1	1	...	3	...	...	...	1	2	8
Bronchocele	...	...	...	...	...	...	...	...	...	...	...	...	...
Miscellaneous	16	8	11	10	15	7	12	5	6	11	16	9	126
Monthly Total	51	23	47	31	53	38	47	20	34	41	52	51	488

TABLE 7.

Showing the Total Number of Diseases in each Month for Six Years.

	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
1836	94	90	83	68	66	101	96	72	48	61	64	49	892
1837	47	65	54	63	46	50	51	54	41	47	36	25	579
1838	70	35	47	33	47	38	25	38	37	38	53	40	501
1839	57	53	67	86	63	47	53	57	36	57	42	65	683
1840	43	60	46	41	52	32	32	53	39	34	31	49	512
1841	51	23	47	31	53	38	47	20	34	41	52	51	488
Monthly Total	362	326	344	322	327	306	304	294	235	278	278	279	3655

In the arrangement of the foregoing tables I have preferred combining the diseases of one class, or those affecting one organ or set of organs in particular, together, to the adoption of the only other alternative, viz., that of giving to each its individual number and space in the scale. The latter plan, would, I conceive, lead to more erroneous conclusions than the former, especially where a comparatively small number of cases has to be dealt with, and where, as is too often the case in public registers, no very great caution is observed in the entry of a disease, according to its minute and specific characteristics: thus, for instance, whilst a combined view of the whole of the diseases of the digestive organs might afford very correct information as to their prevalence and the ratio of their occurrence, as opposed to that of other affections; yet, were we to attempt to divide them all, with reference to the various forms which dyspepsia assumes, we should, probably, have but a very imperfect idea of the real statistical relation which that disease bears to others, in the district referred to.

In cases wherein it is desirable to obtain particular information respecting some peculiar form of a disease, or class of diseases, a separation has been made, as in the instance of *typhus fever*, *eruptive fevers*, *struma*, and *phthisis*.

The large comparative number of diseases recorded in table No. 1., commencing in August. 1836, is accounted for fully, from there having been a greater number of members belonging to the Dispensary for that year than in those succeeding,

and more particularly, from the prevalence of the influenza in the beginning of 1837.

The autumn and winter months are those in which disease seems to be most prevalent in this neighbourhood, of which, August bears the greatest proportion. A careful examination of the tables informs us, that it is the prevalence of dyspeptic and bowel affections at this season which gives to it the preponderance; it will be observed also, that August is one of the three months in which the mortality has been great; I do not know any particular cause for this, since neither simple nor typhus fever is found to have prevailed at this period.*

There is a very great difference between the occurrence of all disease in the autumn and winter, and spring and summer months; a glance at the tables from left to right will show at once the truth of this observation. There is found a marked difference between the account by Dr. Shapter, in the last volume of the *Transactions of the Medical Association*, of the "History of the diseases of Exeter," and that which is here given; but this will not in the least invalidate the correctness of either, as there is very much yet to be learned, as well regarding the influence of climate and locality on disease and mortality, as also respecting the thousand other causes which give rise to morbid action in general.

It is not until minute enquiry has been carried into the comprehensive subject of statistical hygiene, that one feels its weight, its depth, and its vast importance, as a means of aiding physical and

* *Vide* Fever Tables.

philosophical enquiry, and of solving, as far as human means can, the *mystery* of medicine. Great will be the stride which medical science will make, if the objects of the Provincial Association should be carried out, in eliciting *statistical* information, and in exciting the minds of the members of the profession in the provinces, to make proper use of the great power they possess, of contributing towards those materials which remain to be collected and arranged, ere a structure can be erected; a *vast pyramid of facts*, which will prove both useful and durable to the whole world.

Diseases of the Organs of Digestion.—Under this head are included all those cases entered as dyspeptic; diarrhœa, gastritis, enteritis, &c. Their amount, collectively, will be seen to be large compared with the rest of the scale; but not greater, I conceive, than is to be expected, considering the preponderance of stomach and bowel disorders, reigning generally throughout society; and considering, moreover, that numbers are relieved who apply on account of very slight ailments, and are set down under the denomination of *bilious*. The numerous causes, both moral and physical, which combine to cause dyspepsia to be a prevailing disorder almost everywhere, obtain also here. Of bowel affections, diarrhœa is, I should say, the most prevalent; and this may fairly be attributed, in many cases, to an impurity in the water, with which those who reside near the sea are supplied; a cause which is about to be removed.

Dysentery is however very uncommon; enteritis, gastritis, and colic, are diseases frequently met

with, but in no great proportion: this climate is not favourable to attacks of sudden and active inflammation. *Jaundice,* the result of hepatic congestion and sub-acute inflammation of the liver, may be said to be common here; obstruction from gall stones is not so.

Those who labour under a congestive state of the liver, accompanied with a tenderness in its region, where the digestion is slow and imperfect, and a general feeling of lassitude prevails, with a tendency to hebetude and lowness of spirits, I should say such persons ought not to seek the south coast, except in the winter and spring months; this remark will also apply to those who have long resided in an Indian climate, and who suffer from derangement of the biliary functions.

Acute inflammatory dyspepsia, that form of the complaint in which the patient is subject to attacks of local gastritic congestion, more or less accompanied by great nervous susceptibility and mental irritation, with sensitiveness to cold, is likely to be benefitted by this climate.

Hernia.—Although there are many, both male and female, in this neighbourhood, who are ruptured, strangulation is a rare occurrence; not more than two operations have taken place within, at least, twenty years.

Diseases of the Organs of Respiration.—Pneumonia, in its acute form, is not a disease of very constant occurrence here: it is almost always under the control of the usual remedies, such as venæsection, tartar-emetic, and blisters; I have rarely known a case prove fatal. *Pleurisy* is also

not frequent; most cases of this complaint occur during the summer and autumn seasons, when sudden colds are taken from indiscreet exposure, or from bathing when heated, and from drinking cold fluids, such as cider or water, in the haymaking or harvest time. *Bronchitis* is apt to assume the atonic character, the patient suffering from and sometimes finally succumbing under a sero-mucous accumulation in the bronchial tubes; in the acute form it is seldom dangerous, and generally gives way to the common antiphlogistic treatment. *Asthma* I do not often meet with as indigenous, but in numerous instances, I have witnessed the soothing and beneficial effects of the warmth and moisture of the climate on those who were labouring under it. *Cynanche tonsillaris,* and *parotidea,* are rarely dangerous here. *Hooping cough* occurs epidemically, and most commonly with its fellow-traveller, measles, about once in every three years; it made its appearance here in the middle of March, 1837, was unaccompanied by measles until September, when this latter disease became epidemic; they both remained in the town until December. In July, 1838, there were some few cases of hooping cough, and again in July, 1841.

This disease, in this district, seldom proves either very formidable or fatal; it is generally easily managed; I have myself found simple alum, in doses of from two to ten grains every four hours, administered in powder with sugar, together with a mucilaginous mixture, containing hydrocyanic acid, to be the most efficacious means of mitigating and finally subduing the hooping cough, after the

more inflammatory symptoms have subsided. In the *Lancet* for May 30th, 1840, Mr. Chavasse, of Birmingham, states that "he has used the sulphate of copper in hooping cough with the happiest effect." I conceive that the beneficial action of these remedies results, in a great degree, from their *astringent* properties acting on the soft palate, uvula, and fauces; parts which are in a very irritable and relaxed state in those affected with hooping cough.

Influenza has visited this neighbourhood, as well as others, from time to time; in the great epidemic of 1837, the first case occurred at Sidmouth about the 20th of January in that year, a few days after its appearance in Exeter, as recorded by Dr. Shapter; it became almost immediately general amongst the inhabitants, and continued with more or less virulence, until about the middle of March, when it entirely disappeared.

I believe there were no peculiarities in the disease, as it occurred here, different from those given in the description of its character as manifested in other places. In the treatment, the stimulating expectorant plan, with the application, in some cases, of a blister or mustard cataplasm to the chest, was found to be the best adapted and most successful; neither depletion nor drastic purgatives could be had recourse to, without producing great and even dangerous depression, save and except in a very few cases, where the temperament was robust and inflammatory. The mortality was not very great here at the time, although the consequences of the disease in the old, and those of weakly constitutions, were long and severely felt.

Phthisis Pulmonalis.—The very small number of cases of this disease recorded in the tables may possibly cause some hesitation as to a belief in their faithfulness of report, but I have every reason to think that the number is very nearly correctly set down; it is not improbable that a few of those cases entered as bronchitis, cough, &c., may have actually been, or terminated in consumption; but whether or not, I think it may be stated as a certain fact, that this disease is not very common among the poorer classes of this neighbourhood; among the more respectable and upper classes it is often met with, in what relative proportion I cannot say; but speaking from personal observation, I should consider, that consumption has not made such havoc among the numerous family circles here as I have remarked it to have caused in some other places.

Most authorities on the subject agree in the opinion that a "mild and moist climate is that which is the most soothing and favourable to consumptive cases;" and, as far as my experience goes, I certainly have great reason to believe this opinion to be correct: much, of course, must depend on the peculiar habit and temperament of the patient, the stage of his disease, and also the circumstances under which he leaves his home.*

* Sir James Clark, in his admirable work on "Climate," has laid much stress on the precautions and considerations which ought to accompany the invalid on his departure for change of air. Every medical practitioner on the coast, must have constant proof presented to him of the absolute necessity, if real benefit is to be derived, for proper caution and judgment to be observed by the medical adviser, both regarding rules to be laid down for the patient, and also with respect to the situation selected, with reference to place, climate, season, aspect, and general comforts to be obtained; by which, much

A residence on this coast may not be beneficial to *all* at *all* seasons; in the incipient or predisposing state, where the habit of body is decidedly *relaxed*, in the suspected development of the "tuberculous cachexy," in *melancholic* temperaments, more especially, it may be advisable that the patient should seek a more bracing atmosphere during the summer months; whilst in the winter and spring seasons, commencing in October, he will find a climate much better suited to his case than in the more northern and colder inland situations. Young persons, both male and female, on the verge of puberty, in whose constitutions there is reason to

sorrow, embarrassment, and disappointment, would be saved both the sufferer and his friends; for this purpose, it is necessary that the peculiarities of each watering-place should be well known. Sir James Clark has written more especially for those whose destination is abroad; his remarks more particularly apply to the guidance of the rich; but great numbers of those who resort to the milder climates of their own country are persons whose means are limited, who leave home alarmed by the threatening symptoms of disease, barely able to afford the necessary expense; they fly to the place selected, occupy a situation, unsuited perhaps, from aspect, inconvenience, and want of proper ventilation; and there, away from their friends, amidst strangers, sit in anxious and feverish expectation of relieved symptoms and of returning health; the chance, alas! of the realization of which hope they probably have removed further off than before. Often have I seen this demonstrated; and also with the wealthy it is too frequently the case, that patients are ordered to the coast uninstructed, except as to the *place* where they are to go. It is not, I am sorry to say, always the case, that according to Sir James Clark, "When an invalid is sent abroad for his health, he goes, by the direction of his physician, to the climate best suited to his particular case, and at *the most favourable season of the year*. Moreover, he goes prepared to avail himself of all the *advantages* of his new situation, and to avoid, as far as possible, its *disadvantages*." A place may be unexceptionable with regard to its locality, but, nevertheless, there may be numerous *situations* in that place, in which the benefits of both climate and locality may be more than neutralized by different

suspect a strumous disposition, whether from peculiar conformation and growth, or congenital taint, seem to keep in better health, in the colder parts of the year, on this coast.

In cases of hæmoptysis, resulting either from irritability of the mucous surfaces of the respiratory tubes, or from local congestion taking place in the lungs, whether from periodical suppressions or from the presence of tubercles in their primary form, I can speak, from daily evidence, of the fitness of the climate in such cases. In the latter stages of consumptive disease, when the trachea and bronchiæ have been very irritable, and the suppurative process or softening of the tubercles going on, I have witnessed constantly the relief and comparative freedom of breathing enjoyed in the soft marine atmosphere of this coast. Far advanced phthisical patients seem to be much comforted by a residence *close* to the sea in the summer: the

causes: of these may be mentioned, crowded parts of a town, low or damp situations, eastern or northern aspects, imperfect ventilation and dullness. I have more than once witnessed the case of a young and delicate female, with far advanced pulmonary disease, settled in a dull and comparatively comfortless lodging, far away from home, with only one female friend or attendant; a stranger to every one else around; here have I known her wait long, without even the comforts of medical care, for the expected blessing which the climate is to afford; until warned at last, by the approach of death, she has hurried home; hastened perhaps, to a grave which might, under other circumstances, have waited longer for its tenant.

The invalid should have, in addition to climate and situation, if possible, congenial society, or at least, the command of a sympathising friend in times of particular suffering, sadness, or danger. I am of opinion that more benefit would be derived, even in a less favourable situation, with *congeniality* around, than where other advantages abound, but with fewer of those ingredients which cheer a weary life, and sweeten the bitter cup of harrassing disease.

breeze at the open window refreshes them, and the ever varying scene from without, serves to amuse the mind and beguile the weary hours.

With respect to the *inhalation* of different remedies as a means of cure, I have, in many instances, used for a length of time the iodine and conium, as recommended by Sir C. Scudamore ; but hitherto I have not observed any specific or decidedly beneficial results from the former medicine. Inhalation must, however, be considered a valuable addition to other methods of treating consumption ; setting aside the benefits which may or may not be derived from any particular or reputed specific, it is quite certain that *sedatives,* such as the conium, hyosciamus, and more especially, hydrocyanic acid, administered in a vapourised form, are capable of affording more real, although temporary, relief in the latter stages of phthisis, than perhaps any other class of remedies.

Diseases of the Heart.—Organic disease of the heart is not very frequently met with here ; there is nothing in the general occupation of the inhabitants which would predispose them to it. Disorders of the circulation, which have their origin in nervous and hysterical causes, are of frequent occnrrence ; I have witnessed several cases of fatal metastatic rheumatic disease of the heart.

Diseases of the Nervous System and Cerebrum.—These bear the proportion of 1 in 17 to other diseases ; those affections which manifest themselves in particular divisions of the nervous system apart from the head, such as chorea, tetanus, neuralgia, hysteria, and others of an anomalous character, are

as 1 in 38; those which refer more particularly to the cerebrum, such as apoplexy, epilepsy, terminations of blood, and phrenitis, are as 1 in 32.

Affections of the nervous system would appear not to be disproportionally common here; chorea, I rarely see; of tetanus, I have known only one case; of trismus and hydrophobia, not one; hysteria is rather of frequent occurence; I have had, lately, to treat many cases of this protei-form disease, which have alike almost exhausted both my patience and remedies. The cold douche, unsparingly used, and the internal administration of the tr. ferri sesquichloridi with morphine, have been with me the most successful remedies.

The imagination, passions, temperament, and disposition, all tend to baffle the endeavours and secretly undermine the success of the practitioner.

Neuralgia, tic-doloureux, and sciatica, are not among the most familiar indigenous complaints; many persons suffering from these affections resort here, and find themselves benefitted by the climate and warm bathing, particularly in the autumn and winter seasons. In August, 1842, whilst I am now writing, there prevails here, to an extent almost deserving of the title of epidemic, a peculiar affection of the nerves of the head; it commences with furred tongue, slight fever, pulse quick but generally soft, bowels sometimes confined, at others relaxed, and with great pain over the surface of the head, which gradually increases until it amounts to agony, attended with much soreness of the scalp, especially on one side; this continues, with irregular intermissions, for some days or weeks, and then

gradually goes off; I find purging freely, followed by large opiate doses, with warm poppy-head fomentations to the scalp, to be the first best steps; afterwards, giving quinine and colocynth, with a blister at the back of the neck, which sooner or later succeeds in removing the complaint. In one extreme case I used leeches, but with no relief; I cannot account for this unusual visitation; the weather is extremely fine, there is no dampness in the air, neither are the winds cold.

Those persons afflicted with anomalous nervous affections, such as great excitability of both mind and body, who are of an intellectual and often highly endowed character, particularly females, subject to vicarious discharges, and sudden and unaccountable fits, either of excitement or depression, being also particularly sensitive to cold; several such persons I have known, who have enjoyed an unusual share of composure and liberty in this place, when residing in a sheltered situation and warm aspect.

Cerebral Disease.—Apoplexy but seldom occurs, except as the consequence of old age. General paralysis, from debility and rheumatism, I have sometimes witnessed. *Sympathetic* epilepsy in the female, resulting from uterine irritation or suppression, is met with often, and is curable by time and deobstruent remedies. Epilepsy, from dyspepsia, sometimes occurs; but that which is the result of organic disease in the brain is happily rarely seen.

Febrile Diseases, comprising Simple Non-Eruptive Fevers, not Typhoid.—I have separated the *simple* from those fevers which come more properly under the denomination of *typhus*. The relative preva-

lence of all febrile diseases affords much information as to the general salubrity or non-salubrity of a district.

Simple continued Fever, caused, apparently, in children by teething, disordered digestion, improper and scanty diet, cold, &c.; and in adults, by the latter causes, united to numerous others, incidental, such as occasional over exertion, exposure at night in fishing, and in the hot sun during the harvest season, is the more common form of the disease in this neighbourhood; the inflammatory form of fever is not common. The generality of cases yield to the simple treatment of aperient and diaphoretic medicines; when headache prevails, a few leeches to the temples, with the application of cold to the head, afford, for the most part, the relief desired; venæsection is seldom required.

Typhus Fever.—This form of fever, although occasionally occurring, yet very seldom does so *epidemically;* I can affirm, from at least twelve years' observation, that it is not common for typhus, or to speak perhaps more expressively, for any non-eruptive fever of a *contagious* and *fatal* character, to *invade* this district. The following tables will shew the number of fever cases, of both *simple* and *typhus,* that have been admitted at the Dispensary, in the respective months, for the last six years. I may remark, that every case which has been entered in the register as "fever," without any designation, I have set down in the tables in the class of typhus; I have reason to believe that many may not have really proved to have been of that character, and therefore the number may be considered as rather over than under-rated.

TABLE 1.

Showing the Number of Cases of Simple Fever occurring in each Month during Six Years.

	Aug.	Sept.	Oct.	Nov.	Dec.	an.	Feb.	March.	April.	May.	June.	July.	Total.
1836	1	5	7	4	4	2	7	2	2	1	2	...	37
1837	...	...	...	1	2	3	1	...	3	2	...	1	13
1838	2	2	1	2	1	2	1	1	...	1	1	2	16
1839	4	9	5	1	3	3	5	3	...	4	1	3	41
1840	...	4	1	2	...	...	4	5	2	1	...	...	19
1841	4	...	...	1	1	1	1	1	5	1	...	...	15
Total	11	20	14	11	11	11	19	12	12	10	4	6	141

TABLE 2.

Showing the Number of Cases of Typhus Fever occurring in each Month during Six Years.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
1836	...	...	1	...	1	...	...	...	1	4	...	...	7
1837	...	...	...	1	2	3	1	...	3	2	...	1	13
1838	2	2	1	2	1	2	1	1	...	1	1	2	16
1839	4	9	5	1	3	3	5	3	...	4	1	3	41
1840	...	4	1	2	...	...	4	5	2	1	...	...	19
1841	4	...	...	1	1	1	1	1	5	1	...	...	15
Total	9	4	11	24	11	2	5	4	4	10	2	6	92

Out of 3655 cases, including all diseases, it will be seen that 233 consist of fevers, of which 141 are cases of simple fever, which may be said to comprehend those which would range under the heads of *synocha* and *synochus*, and 92 under the denomination of *typhus*. The *simple fever* cases are as $\frac{1}{25}$th of the whole, or in the proportion of 4 per cent. The *typhus fever* cases are 92, or $\frac{1}{40}$th of the whole number, or $2\frac{1}{2}$ per cent—the whole number of fever cases being in the proportion of $6\frac{1}{2}$ per cent. to the whole number of diseases.

The average thus shown is extremely low as

compared with many other districts, but not, I conceive, lower than might have been expected from a locality in which many of the predisposing causes or seeds of fever are wanting. Abundance of water, free drainage, a constant supply of fresh air, both from land and sea, and a thin population, must, of course, militate much against the accumulation of miasma or the persistence of any particular contagion.

It will be remarked in the subjoined table, that the months and also the years in which simple fever prevailed, are marked by a corresponding existence of typhus.

TABLE 3.

Showing the Total Number of Cases of Fever in each Month for Six Years.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Total.
Typhus Fever	9	4	11	24	11	2	5	4	4	10	2	6	92
Simple Fever.....	11	20	14	11	11	11	19	12	12	10	4	6	141
Total	20	24	25	35	22	13	24	16	16	20	6	12	233

The months of October, November, December, and February, are those in which fever has most prevailed in this neighbourhood, for these past six years. The tables show a great diminution in the number of febrile diseases during the summer months; thus the statistics of fever, as far as they at present go, of Sidmouth and Exeter, strikingly agree with reference to the *season* of its greatest prevalence, and would seem to affirm (as far as this particular part of Devonshire is concerned,) Dr. Shapter's observation, that "the fine cold bracing weather is really the weather most liable to fever,

while the warm and sultry months of summer are those in which it prevails the least."

The character of the disease, as regards the affection of different organs in particular, as well as the treatment required, has been subject here to much variation; a remark which applies to the history of fever in every district, The fevers which have occurred in this neighbourhood of late years, as far as my observation goes, have borne the following characters. First, and most frequent, those in which abdominal complications existed, commencing with diarrhœa, accompanied by great pain, followed more or less by tympanitis, with a quick, small, but wiry pulse; these cases have, for the most part, borne bleeding, if adopted at the onset. Fever, with acute and sub-acute cerebral disease, occurs next in frequency; in those cases which have occurred of this kind lately, *deafness* has been one of the first symptoms. The mixed form of fever is not uncommon, chiefly with the complication of head and abdominal affection. Fever, with *thoracic* inflammation, is the least frequent in occurrence.

More cases of fever occur on the eastern side of the town than in any other; here the ground is low, and the houses are in immediate proximity with the field termed the Marsh, in which is the mouth of the river Sid, where the chief common sewer terminates.

Intermittent Fever, I may say, is not known here; I have never seen a case of idiopathic ague in this part.

Eruptive Fevers.—These comprise chiefly scarlatina, measles, and small pox. Scarlatina has generally made its appearance here in the autumn and winter seasons. At the commencement of 1837 it was prevalent, but in a very mild form; there was

scarcely an instance in which it proved fatal; for several years, although many cases occurred at different periods, it came not as an epidemic, until the commencement of September, 1841, when it prevailed to a great extent, continuing until the beginning of March, 1842. There was scarce a family that escaped the contagion, and many children fell victims; in the course of a few weeks many adults took the disease, and with them, although in no case was it fatal, it proved nevertheless, a severe visitation. The weather was exceedingly mild for the season; an occasional slight fall of snow, not remaining above a few hours on the ground, with about four days' hard frost, made up the winter of that season. At the onset, the cases were of an exceedingly mild character, the symptoms being nothing more than soreness of the throat, without ulceration, accompanied with some fever and the usual appearances on the skin; after a month's intermission the disease became very general, and was of a severe type; ulceration of the tonsils and fauces was then common, the skin often of a dark red or bluish colour, from the effects of a partially suppressed eruption; many children and young persons fell victims at this time, and many who survived the complaint itself, suffered severely from its consequences, which were anasarca, enlargement and suppuration of the parotid glands, with great prostration of strength, and in one or two cases, suppuration in the joints.

In addition to the diaphoretic and (depletory in some cases) treatment, it has been the custom with me to add that of sponging the body, once or twice a day, with hot vinegar and water, or sometimes

with hot vinegar. I attach very much importance, in the treatment of scarlatina, to attention to the state of the skin, from a conviction, that very much is done towards rendering the complaint less formidable, by *encouraging* the eruption to appear in its natural seat, thus preventing internal and dangerous derivative changes; during convalescence, also, I think sponging the surface of the body daily, and with some stimulating fluid, such as a weak solution of nitric acid, of essential service; it seems evident, that almost all the unpleasant sequelæ of scarlet fever may be attributed to the want of *permeability* of the cuticle, and the total suppression of cutaneous transpiration, which is one of the most prominent features in the history of the complaint.

During the late epidemic it was often observed, that in a household, some members of which were already suffering from scarlatina, there would be one or two who would sicken with all the premonitory symptoms of the complaint, but no *eruption* appeared; some of these would get well and not ail again; but the majority, particularly children, became the subjects of well-marked scarlatina some weeks afterwards.

Measles have prevailed in this district during these last six years, at the following periods, viz.: from the middle of September, 1837, to about the end of November; in November, 1838; and in October, November, and December, 1839; since which, we have been perfectly free from them. It will be remarked that each visitation occurred in the winter months. In 1837 and 1838 the character of the disease was very mild, and it rarely proved fatal; in 1839 the symptoms were much more severe;

typhus fever was also prevalent in the months of November and December; and the measles, in many cases, bore a typhoid type and were frequently fatal.

In cases, in which, either from debility or some other suppressing cause, the eruption did not make its appearance fairly on the surface of the skin, as in scarlatina, I have found the plan of sponging the body with hot vinegar and water very efficacious.

Of the sequelæ of measles, one in particular is worthy of notice, of which there were many instances in the epidemics of 1838 and 1839: I allude to swelling and ulceration of the gums, with ptyalism, bearing almost an exact resemblance to mercurial salivation. In the first instance I imagined that the affection had been caused by the calomel which had been combined with occasional aperients; but after meeting with more cases in which no mercury had been exhibited, which presented the same appearances, I felt no longer a doubt but that the soreness of the mouth was peculiar, and *sui generis*. This consecutive complaint was very difficult to cure; the gums, in some cases, were quite in a sloughing state, and in some, the teeth were lost.

In the *Lancet* of December 7th, for the same year, is detailed an account of many cases of "gangrene of the mouth" occurring after measles, by Dr. P. H. Green; and in the same number is a notice of an inquest on the body of a child who died of the disease, the father attributing the death to an improper exhibition of mercury, which was not the case.

Small-Pox.—Small-pox has occurred in Sidmouth once only during six years; it broke out in the beginning of January, 1838, and was more or less prevalent for nearly three months; about eight of

those affected fell victims. Two adults, who were well known to have had small-pox previously, were seized with it secondarily, and one young man of twenty years of age, who was much marked with small-pox, died from a second attack.

Cow-Pox and Vaccination.—Much difficulty has been experienced here, as well as in most other places and countries, where legislative enactments have not been paramount in carrying out the system of vaccination in that general and careful manner which is absolutely necessary, in order to decide its true claim to that power of effecting a total prevention of small-pox, to which, from its results in other parts of the world, it seems to be entitled; nevertheless, I am happy to be enabled to state that much of the prejudice previously existing has subsided here, and that the patience and zeal of the medical adviser has less to combat with in this particular. The increased frequency of secondary small-pox has proved of great service in bringing over the weak in faith; much harm has been done to the cause by the over zealous claiming too much for vaccination; hence, one case of apparent failure creates an hundred enemies, and spreads distrust far around.

Cutaneous Diseases.—These comprise, chiefly, lepra, psoriasis, porrigo, scabies, eczema, and erysipelas. The most common forms of skin diseases occurring here, may be said, I think, to be those of the squamous denomination. Many cases of lepra and psoriasis are met with; the former proves often rebellious to all ordinary treatment; I can bear testimony, however, to the great benefit many sufferers have derived from the treatment and the use of the

waters, at the Bath Hospital. Tinea capitis is very common; and porrigo of the scalp, more particularly in the form of dandriff, is a complaint which tries much the skill and patience of the practitioner. Erysipelas seldom assumes the phlegmonous character; erythema may be said to be the more common form in which it is met with here.

Syphilitic diseases in a virulent state, are seldom offered for treatment; long concealment or neglect is difficult in small towns.

Struma.—Although I have stated that phthisis pulmonalis, or, as it is generally allowed, *scrofula of the lung*, does not appear to bear the usual proportion in the scale of disease here, still I do not consider that we enjoy any peculiar immunity from *scrofula generally*. There are some who question the identity of scrofulous diseases with pulmonary consumption; but if analogy in constitutional symptoms and consequences, if physiological experiments and pathological investigations, and similarity in the exciting causes, may be allowed to have any weight, we can only conclude, at least in the present state of medical knowledge, that both in their remote and proximate causes, as well as in their ultimate results, they bear every similitude to that *oneness* of character which would justify us in pronouncing them as identically allied, and would lead us to believe, in the language of one of the most enlightened writers on the subject, Sir J. Clark, that "they all originate in the same constitutional disorder, acknowledge the same remote causes, and admit of the same rules of prevention; and I may add that the same mode of treatment is essentially applicable to the whole."

Nevertheless, it is only reasonable to believe that *circumstantial* causes, of which *climate* ranks the most prominent, may exert considerable influence on the organ or class of organs which scrofula may affect.

It is not difficult to imagine, for instance, that a climate subject to sudden changes from extreme heat to cold, or habitually very cold or warm, must exert considerable influence in determining the *seat* of scrofulous disease in the body. Very much remains yet to be understood with regard to the influence of temperature, setting aside other climateric peculiarities, on the question of *pulmonary* liability. The extremes of heat and cold appear to have set their own land-marks in this respect, inasmuch as it is well known, that in tropical climates, taking for instance the range of the East and West Indies, Europeans, and natives in particular, are more liable to consumption than the inhabitants of more temperate regions; and in parts where the extremes of heat and cold are occasionally and suddenly experienced, as in many parts of Italy, this disease is very common; whilst in the north of Europe, as in Russia, pulmonary consumption is said to be comparatively infrequent; yet scrofula, manifested in the glandular system, skin, and extremities, exists in a formidable degree. In cold climates, both respiration and circulation are slower than in warm. hence it might be inferred that the lungs would be the least liable to disturbance of function of any part of the body; on the other hand, the cutaneous system being the most influenced by cold, is most likely the cause of scrofulous disease taking its seat more frequently in the skin, glandular system, and joints; much further investigation will

be required before anything like true information on this subject can be attained. *Climate* may not be the *fons et origo* of the strumous habit, but that it has much to do with its manifestation in the form of active disease in peculiar parts of the body, seems very clear—a fact which would form an interesting subject for further enquiry.*

Rheumatism occurs in the proportion of 1 to 40 of other diseases. The sub-acute and chronic forms are those in which it is most commonly met with. Acute inflammatory rheumatism is not of frequent occurrence; the pericardium and heart are sometimes the chief seat of its attack; I have only met with one case of cerebral rheumatic metastasis, which proved fatal. In the treatment of chronic rheumatism, I have found *alkalies* the most beneficial, of which, iodidum potassii ranks the first: in the acute

* During the passage of this paper through the press, a communication from the pen of Sir George Le Fevre, late physician to the British Embassy at St. Petersburgh, has appeared in the *Lancet*, which will, doubtless, greatly excite the attention of the profession at home, on the subject of "Chamber Warmth and Protecting Raiment," and their effects in preventing consumption. The immunity of the Russians from pulmonary complaints is there ascribed, and, apparently, with much justice, to the very great caution observed by them in maintaining a high and equable temperature in their houses during the cold season, and in the choice of warm non-conducting raiment when in the open air. The article is worthy of the perusal of every one who is interested on the subject. It would be very desirable, however, if Sir George would further favour us with an account of the *disadvantages*, as well as the *advantages*, of the system pursued by the Russians; whether other diseases, equally injurious and fatal in the end, may not be generated by constantly living in a confined and vitiated atmosphere. In a word, a comparison of the nosology of Russia with that of England might tend much to enlighten us on the very important subject of the "Influence of Climate on Health," and, most probably, would lead to the adoption, more generally on our parts, of more effective protective measures in our domestic economy.

form, I find no plan equal to venæsection and the exhibition of calomel and opium, followed by the cinchona bark combined with diuretics.

Dropsy.—Dropsy in any of its forms, save that which is the consequence of scarlatina, is here infrequently met with. Hydrothorax is more common than either anasarca or ascites. Ovarian dropsy, wherever I have met with it, has always happened with the unmarried. Hydrocele is comparatively rare. I seldom meet with a case of diabetes.

Diseases of the Generative Organs (Fem.)—Of these, amenorrhœa in weak and anæmic constitutions, and leucorrhæa, are the most common. Suppression of the uterine functions, in those of plethoric habit is often benefitted by a residence in this climate. Cancer of the uterus is very seldom met with.

Bronchocele.—There are very few cases of this affection here seen. Enlargement of the thyroid gland in young females is more common; but it is almost always controlled by attention to the general health, and the internal and external use of iodine.

Diseases of the Urinary Organs—Are also very few in number. *Functional* disorder is the most frequent; but indications of organic disease, as diabetes, nephritis, cystitis, are very uncommon. I can recollect but one or two cases of stone in the bladder as having occurred in the course of many years.

Worms.—The ascaris vermicularis and lumbricoides are the most frequently known here. Tœnia is now and then met with.

The *miscellaneous* cases are those which come under the head of accidents—tooth-ache, vaccination, &c., and do not require particular notice.

Obstetric Medicine.—Of 134 cases of midwifery, of which I have kept any correct account, the following is the result :—

Natural Labours, unattended by any irregularity ...	120
Twin cases	2
Face presentations	3
Vertex ditto	2
Arm ditto	1
Breech ditto	2
Excessive hœmorrhage	2
Puerperal convulsions	1
——— mania	1
Deaths	0
Total	134

Gestation or parturition is not here attended, generally, with any very unusual difficulty. Puerperal inflammation is of uncommon occurrence, and deaths in childbed are very rare: I have only once in my practice had recourse to instruments; and I am convinced that if more judgment was exercised with regard to the exhibition of the ergot of rye, and more patience endured by the medical attendant, recourse to instrumental aid would be of still more rare occurrence than it is at present.

STATISTICS OF MORTALITY.

In the following tables are given the number of burials which were registered for ten years, from 1831 to 1841 inclusive; they will comprise very nearly the exact number of those who have died in the parish and immediate neighbourhood of Sidmouth during the above period. Very few bodies are carried away for burial, and only in one or two instances, within twelve years, has it happened that an interment has been made in any other place than in the parochial cemetery.

TABLE 1.

Showing the Number of Burials in the Parish Church of Sidmouth during Ten Years; also the Number of Deaths at different ages, from Birth upwards.

AGE.	1831.			1832.			1833.			1834.			1835.			1836.			1837.			1838.			1839.			1840.			
	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Male.	Fem.	Total.	Total.
Under 1 Year	4	...	4	3	5	8	5	2	7	7	8	15	5	9	14	8	3	11	3	4	7	9	7	16	5	5	10	6	4	10	102
1 to 2	...	...	...	1	...	1	4	1	5	3	...	3	...	1	1	2	2	4	3	3	6	3	1	4	2	3	5	1	7	8	37
2 — 5	...	...	...	...	1	1	2	6	8	...	1	1	2	3	5	4	3	7	4	3	7	3	1	4	...	3	3	1	...	1	37
5 — 10	3	...	3	1	1	2	1	...	1	1	1	2	...	2	2	...	1	1	1	1	2	2	1	3	...	3	3	1	...	1	20
10 — 20	2	1	3	...	2	2	1	...	1	1	1	2	1	1	2	3	3	6	4	2	6	1	4	5	1	5	6	...	3	3	36
20 — 30	2	1	3	2	2	4	4	3	7	...	...	...	1	3	4	...	7	7	2	4	6	2	2	4	...	6	6	1	1	2	43
30 — 40	...	1	1	...	2	2	4	5	9	2	1	3	2	4	6	...	1	1	2	2	4	1	1	2	2	3	5	2	1	3	36
40 — 50	4	2	6	1	...	1	1	1	2	...	1	1	3	...	3	2	3	5	...	1	1	1	...	1	3	2	5	1	4	5	30
50 — 60	4	2	6	1	...	1	1	3	4	4	2	6	2	2	4	2	3	5	1	4	5	5	2	7	...	4	4	1	2	3	45
60 — 70	5	3	8	1	5	6	...	2	2	1	1	2	...	2	2	1	7	8	3	2	5	1	3	4	2	1	3	1	3	4	44
70 — 80	3	4	7	...	6	6	...	5	5	4	3	7	6	3	9	3	7	10	7	2	9	1	4	5	...	3	3	1	5	6	67
80 — 90	2	3	5	...	2	2	...	4	4	1	5	6	...	...	...	...	1	1	...	1	1	1	...	1	...	1	1	2	...	2	23
90 — 100	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	1	...	...	...	1	...	1	...	...	...	...	1	1	4
100 and upwards	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	29	17	46	10	26	36	23	32	55	24	24	48	22	31	53	25	42	67	30	29	59	31	26	57	15	39	54	18	31	49	524

TABLE 2.

Showing the Number of Burials each Month, at the Parish Church of Sidmouth, for Ten Years.

	1831.	1832.	1833.	1834.	1835.	1836.	1837.	1838.	1839.	1840.	Total.
January ...	3	3	1	3	3	7	8	10	6	7	51
February...	2	1	7	4	8	6	7	3	7	9	54
March	1	2	3	9	3	6	5	7	3	8	47
April	7	1	3	5	6	6	7	4	1	3	43
May	6	4	6	4	3	7	3	1	3	1	38
June.....	2	2	2	1	3	5	9	3	3	2	32
July	7	3	2	2	8	6	3	7	7	...	45
August.....	4	3	4	4	4	2	4	6	5	5	41
September .	3	7	11	2	5	6	8	4	2	5	53
October ...	3	3	6	5	2	7	...	5	4	2	37
November .	5	4	3	5	3	3	1	3	8	7	42
December .	3	3	6	4	4	4	4	5	5	3	41
Total ...	46	36	54	48	52	65	59	58	54	52	524

TABLE 3.

Showing the Number of Baptisms in the Parish of Sidmouth for Ten successive Years.

	Male.	Female.	Total.
1331	51	34	85
1832	33	46	79
1833	40	46	86
1834	43	32	75
1835	49	46	95
1836	51	50	101
1837	44	41	85
1838	41	39	80
1839	42	52	94
1840	31	43	74
Total	425	429	854

The number of deaths in ten years, according to table 1, has been 524, being at the rate of 52.40 per annum, of which 227 were males, and 297 females; the former, being in proportion to the latter, as $2\frac{1}{2}$ to $1\frac{3}{4}$.

The table indicates a moderate share of longevity in the inhabitants. More persons die here between the ages of 50 and 90 than between those of 10 and 50; four have reached the age of between 90 and 100. There are a great many persons, both male and female, in the parish, of very advanced age; the sailors and fishermen, for the most part, enjoy long lives.

The mortality of Sidmouth, as compared with other places, would seem to rank low; taking the mean of the population between the census of 1831 and 1841, the relative number of deaths per annum are 1 in $63\frac{1}{2}$. The following comparisons are taken from *Vivian's Views of Torquay* and *Dr. Price's Tables*:—

Torquay	1 in 69
More lately	1 — 61
Country Parish in Bradenburgh	1 — 45
Holy Cross, near Shrewsbury	1 — 33
Berlin	1 — 26
London	1 — 20
Vienna	1 — 19
Cheltenham*	1 — 59
Sidmouth	1 — $63\frac{1}{2}$

The words "more lately," with reference to Torquay, mean, since there has been such an influx of visitors in a dying state; and this circumstance must be taken into consideration in computing the comparative mortality of every watering place.

The months in which the *greatest* number of deaths take place, as shown by table No. 2, are those of *January, February,* and *September;* those in which there is the *least* mortality are *May, June,*

* "Medical Topography;" *Transactions of Medical Association*, vol. vi.

and *October*. This in some measure corresponds with the periods of the occurrence of disease. The mortality in infants is striking, but it is not so high as in many other places.

DEATHS UNDER TEN YEARS OF AGE.

In Sidmouth,	nearly 1 in $2\frac{3}{4}$	of the whole number.
In Cheltenham,	ditto 1 — 2	ditto.
In Exeter Town district,	ditto 1 — $2\frac{1}{2}$*	ditto.
Ditto Country ditto,	ditto 1 — $2\frac{1}{2}$	ditto.

The number of births registered in ten years has been 854; the deaths for the same period are 524, being in proportion to the births as 1 to 1.62; but the number of baptismal registers do not give the true amount of births, as many children are not brought to the church for baptism by an episcopal minister.

* Dr. Shapter's "Medical Topography of Exeter;" *Transactions of Medical Association*, vol. vi.

PART III.

ESSAYS AND CASES.

ARTICLE III.

EXPERIMENTAL AND PRACTICAL RESEARCHES ON THE STRUCTURE AND FUNCTION OF BLOOD CORPUSCLES; ON INFLAMMATION; AND ON THE ORIGIN AND NATURE OF TUBERCLES IN THE LUNGS.

BY WILLIAM ADDISON, F.L.S.,

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"In these days of various research actively pursued in so many countries, it would require more reading than is compatible with actual practice to collect together all that has been done on these subjects; nor would a single volume suffice for the mere references needful to such a work."—Dr. Holland.

I. *Human Blood Corpuscles.*—1. *Red Corpuscles* 2. *Colourless Corpuscle.* 3. *Molecules and Granules.* 4. *Fibrine.*

II. *Pus Corpuscles.*

III. *Blood Corpuscles, and Lymph Globules of the Frog.*

IV. *Inflammation.*

V. *Cells.—Vegetable: Flower, fruit, leaf, pollen grains, spores. Animal: Vesicles of the liver, epithelium, animalcules, colourless blood corpuscles.*

VI. *Aëriferous Structure of the Lungs.*

VII. *Tubercles.*

The researches forming the subject of the following memoir were commenced, and many of the results committed to paper,* previously to the perusal of Dr. Martin Barry's "Memoirs on the Corpuscles of the Blood," printed in the *Philosophical Transactions* for 1840 and 1841. According to the statements of this observer, he has found every tissue which he has examined "to arise out of corpuscles having the same appearance as the corpuscles of the blood."

From the nature of the subjects especially engaging my attention, viz., tubercle, tubercular infiltrations, and hepatization of the lungs, I have pursued a course of investigation different from that of Dr. Barry. I find all the varieties of epithelial cells and pus corpuscles to arise out of the *colourless* corpuscles of the blood, so far confirming Dr. Barry's conclusion; and I further find, that the morbid deposits above mentioned appear to have the same origin.

Before I proceed to give an account of my own researches, it will be necessary to make a few preliminary remarks upon the terms used by Dr. Barry to designate the minute objects seen in the interior of the blood corpuscle, which he calls "dark objects," "the foundations of future cells," but for which I have retained the terms "molecules" and "granules." The microscopic powers I have used magnify 250 and 500 diameters linear; and all subsequent descriptions have reference to objects as they appear with the former power, unless the contrary be expressly stated.

* *London Medical Gazette*, December, 1840, and January, 1841, "On the Colourless Globules in the Buffy Coat of the Blood."

Black spots (*a*, plate I, fig. I) on a white ground, having a diameter of only $\frac{1}{50}$in., are distinctly visible to a person with a good sight, when held at the shortest distance for distinct vision. There are objects in the blood, in the blood corpuscle, and in all organized tissues, visible as similar black spots when magnified 250 times; hence their actual measure cannot be greater than $\frac{1}{100,000}$in.: for these objects I have used the term "molecules."*

There are other objects in the blood, in the blood corpuscle, and in all organized tissues, which, with the same magnifying power, are visible as bright points bounded by a dark circle: these I have called "granules."†

I am aware that globules of fat come under this definition of a granule; nevertheless, for reasons which will appear in the progress of this paper, I have deemed it necessary to keep in view a distinction between the smallest visible *dark points* and the smallest visible *bright ones*, by terms having no reference to their exact nature. A human blood corpuscle of mean dimensions has a diameter of $\frac{1}{2800}$in., and it takes usually four or five granules to reach across it; hence the measure of a granule is about $\frac{1}{11,000}$in. or $\frac{1}{14,000}$in. There can, however, be no precise measurement adapted for these minute objects, which vary in their size.

Molecules are the objects called by Dr. M. Barry "dark objects," "dark globules," and "foundations

* Wagner; *Icones Physiologicæ*, Fasciculus 1, table 1, fig. 5; table 6, fig. 1; and Fasciculus 2, table 13, fig. 2, B.

† Wagner; *Icones Physiologicæ*, Fasciculus 1, table 6, fig. 5 and 6; table 3, fig. 16. Fasciculus 2, table 13, fig. 1, D., and fig. 2, A., for granulated corpuscles.

of new cells;" and granules are synonymous with the "discs" of the same author. "The object called by me 'disc,'" he says, "is synonymous with the basin-shaped granules of Vogel, and the spherical molecules of Gulliver, seen in globules of pus."*

Dr. Barry has noticed my remarks on the colourless corpuscles in the buffy coat of the blood; and he calls these corpuscles "parent cells."†

I. ON THE BLOOD CORPUSCLES OF MAN.

1. Human blood corpuscles, examined by the microscope, exhibit an appearance of two circles, one within the other. The area of the inner circle is sometimes seen brighter (plate 1, fig. 1, *b*), sometimes darker (*c*), than that of the outer one; and sometimes the shading of the two circles causes the corpuscles to appear as if they were slightly hollowed out from the circumference towards the centre (*d*.) These variations of light and shade may be produced by gently approximating the corpuscles towards or by removing them from the focus of the microscope. When the corpuscles are crowded together, they become elongated and compressed into various shapes, and the outline or figure of the inner circle is equally affected with that of the outer one, but the matter of the two circles is never seen to mingle; and when the pressure is removed, both of them regain their pristine form. (Plate 1, fig. 2.)

Blood corpuscles therefore appear to consist of

* *Philosophical Transactions*, part ii., 1841, p. 223, par. 105.

† *Philosophical Transactions*, "On Fibre," pp. 107 and 109.

two elastic vesicles, one within the other, and to possess the following structure:—1st, an external and highly elastic tunic, forming the outer vesicle; 2nd, an inner elastic tunic, forming the interior vesicle; 3rd, a coloured matter, occupying the space between the two tunics; and 4th, a peculiar matter, forming the central portion of the corpuscle. I am aware that this description of the structure of the human blood corpuscle does not accord with that usually given by physiologists. My experiments lead to the conclusion that there is a central portion in the interior of the red corpuscle gradually increasing in size and development, and perfectly distinct from the coloured portion; but whether it be inclosed in a distinct tunic or not, is immaterial as regards the argument founded on the following investigations.

2. *Two very distinct kinds of Corpuscle may be distinguished in the Blood.*—A spot of recent blood, just withdrawn from the skin by a puncture, having been pressed into a thin film between two slips of glass, the surfaces of which fitted evenly on each other, was examined by the microscope. During the examination the glasses were frequently pressed together gently with the point of a finger, so as to put the corpuscles in motion, and the eye was thereby directed to several remarkable corpuscles which retained their circular form, and appeared harder or of a firmer structure than the rest; for the softer corpuscles, urged by the gentle motion given to the glass, passed to and fro around them, losing their figure; the softer corpuscles adhered together in rows and irregular masses, but the others had

no disposition so to do. (Plate 1, fig. 3.) The corpuscles thus discriminated were somewhat larger than the rest; the inner vesicle or central portion was larger, and numerous minute dark points or molecules were distinctly visible in it. By gently altering the focus of the microsope to and fro, they presented a peculiar and characteristic pearly aspect, and exhibited refractions of the light which could not be produced in any of the softer corpuscles. These are the colourless corpuscles of the blood.* By repeating this experiment with blood just drawn from any inflamed surface, as a pimple or the base of a boil, they are found very abundant; and in blood taken from the skin of a patient in scarlet fever, or from the spots of any cutaneous disease, they are remarkably numerous and conspicuous. It is impossible to form an accurate estimate of the depth or tone of the colour of the red corpuscles, viewed singly as microscopic objects; hence the distinctive character of the colourless blood corpuscle, seen in this way, does not arise so much from any obvious or striking difference of colour, as from its greater resistance to pressure, from the greater relative size of the central portion, from the dark points or molecules visible in it, and from the peculiar manner in which it refracts the light. In making this experiment I have met with three very distinct and characteristic conditions of the red corpuscles: sometimes they are banded together in rows; at others, they appear completely fused together in patches; and again they are sometimes seen having

* *Medical Gazette*, December, 1840; January, 1841.

no disposition to cohere. The firm colourless corpuscles may, however, always be easily detected.

3. *Of the Red Corpuscles.*—When the red corpuscles have been kept a day or two they lose their elasticity and are found in various altered forms; if caused to roll over during examination their thin edges and flat circular faces are alternately presented to view; during these movements the inner vesicle or the central portion of the corpuscles may be seen as a bright cylinder within the outer tunic (plate 1, fig. 4, *e*); or as two bright granules connected together by a straight or curved dark (*f*) or bright (*g*) line. Sometimes two strong lines are seen at one part of the circumference of the corpuscle (*h*); and frequently the corpuscles assume a permanent crescentic shape, the central portion projecting from the inner or concave aspect of the crescent (*i.*) Many of these phases may be seen successively in single corpuscles during their movement; and occasionally, by accurately watching them, I have seen the central portion exhibit independent movements, dividing into granules which afterwards coalesced. The red corpuscles frequently exhibit a very remarkable spontaneous change. When making the experiment (par. 2) we may almost always observe the central portion of many of them divided into molecules, which are attracted to the circumference of the corpuscle, forming the beaded border so accurately described by Dr. M. Barry, in the memoirs before referred to. I have several times counted from six to ten molecules, or even bright granules around the circum-

ference (plate 1, fig. 5); I have also repeatedly observed, when making the experiment (par. 2), that the corpuscles, after adhering together in rows for a little time, separate and become smaller, contracting their dimensions so much, that they are not more than one half or a third their former size (fig. 5, *j*); and those corpuscles which exhibited the beaded border lose it.

4. *Of the Colourless Corpuscles.*—The pale or colourless corpuscles, although they may readily be distinguished in every drop of blood, by the experiment (par. 2), are most conveniently obtained for microscopical examination from the fluid or liquor sanguinis, at the surface of buffy blood before the fibrine coagulates. These corpuscles vary in size and appearance; they are seldom less than the red corpuscle, frequently much larger. The central portion or inner vesicle is clearly defined; its outline appearing like a delicate filament just within the outer tunic of the corpuscle. (Plate 1, fig. 6, *k*.) The interval between the outline of the central portion and the outer circumference of the corpuscle is very small and without colour; sometimes there is no interval between them, and then the corpuscles have an uniform molecular aspect. (Plate 1, fig. 6, *l*.) The central portion has at all times a molecular or minutely granulated aspect, and frequently one, two, or more granules, during the observation, become distinctly visible in it. The colourless corpuscles of the blood have been seen under various circumstances by many previous observers, and described under the deno-

mination of lymph globules, pus globules, the white globules of the blood, blood corpuscles of the second form, and *exudation* corpuscles.

5. *Of the Molecules, Granules, and Fibrine.*—During the examination of the colourless corpuscles in the liquor sanguinis of buffy blood before it coagulates, a great number of isolated molecules and granules, not inclosed in any corpuscular tunic, may be seen; they are mingled with the colourless corpuscles, but can never be confounded with them on account of their minute size. (Plate 1, fig. 7 and 8.) They are frequently seen in separate groups, which have sometimes a circular outline, appearing as if the corpuscular tunic had been dissolved away from around them. After a short time the fibrine may be seen coagulating. Exceedingly delicate and perfectly cylindrical fibres or filaments, having a diameter even less than the molecules, first appear crossing the field of the microscope; they gradually increase in number, intersecting each other in various directions, and at length form a complete network, in the meshes and angles of which the colourless corpuscles and the molecules and granules are entangled and drawn together, forming, with variable proportions of included serum, the entire mass of the buffy coat of the blood.* (Plate 1, fig. 8.)

I have never seen the fibrine evince the slightest tendency to form either molecules, granules, or corpuscles of any kind, though I have repeatedly seen it coagulating into thick films under the microscope; nor have I ever seen an *exudation* corpuscle, if what is meant by this term be a corpuscle formed by the

* *Medical Gazette*, March, 26, 1841, and April 15, 1842.

fibrine whilst coagulating. The elements of the blood therefore visible by the microscope, without any addition or manipulation, are, 1st., the red corpuscles; 2nd., the colourless corpuscles; 3rd., molecules and granules in the interior of the colourless corpuscles; 4th., molecules and granules not inclosed in any corpuscular tunic; 5th, the fibrine.*

6. *On the effect of Water, the Dilute Acetic Acid, and Liquor Potassæ (Brandish's Alkali), on Blood Corpuscles.*—If a drop of *water* be added to recent human blood, its effect upon the red and the colourless corpuscles is very different. If the proportion of water to blood be small, the tunic of the red corpuscle is dissolved, and the colouring matter dispersed, leaving the central portion enlarged, with a molecular or finely granulated aspect, faintly visible (plate 1, fig. 9); or the corpuscles contract to one-half or a third their former dimensions, without any dissolution of their structure, and they remain with a stronger outline than before. (Plate 1, fig. 5, *j*.) If the proportion of water be greater, the corpuscles are entirely destroyed, leaving an indistinct hazy matter in the field of the microscope, which cannot, without the highest powers, be resolved into molecules. The *colourless corpuscles*, on the addition of water, do not experience any sudden change; they, therefore, stand out promi-

* Mr. T. Wharton Jones, in his "Observations on the Blood," first published in the *British and Foreign Medical Review*, for October, 1842, thinks that I have overlooked the fibrine in my account of the "Colourless Globules of the Buffy Coat of the Blood," in the *Medical Gazette*; but a reference to the articles published in this periodical for March 26, 1841, and April 15, 1842, will show that he is wrong in his idea.

nently amid the faintly visible central portions of the red corpuscles. They very soon, however, begin to alter their aspect, exhibiting various internal movements, during which the outline of the central portion of the corpuscle disappears. (Plate 1, fig. 10, *m*.) Bright granules and dark molecules may frequently be seen moving in the interior of the corpuscles, and sometimes they form a border at the circumference. (Fig. 10, *n*.) During these changes the corpuscles increase considerably in size by imbibition; the molecules and granules also become larger and more distinct; at last, the corpuscles burst, and the molecules and granules are dispersed. (Fig. 10, *o*.)

A drop of serum just coloured by the red corpuscles was examined by the microscope. Most of the corpuscles were shrivelled and irregular in outline; there were several rows of them. (Plate 1, fig. 11.) A drop of water, in which a little gum had been previously dissolved, was cautiously added. The red corpuscles became slowly distended by imbibition, without being ruptured; the rows of flattened corpuscles were seen moving; and the central portions of them, which could not be distinguished at first, became visible, apparently drawn to one side. After a short time the central portion was enlarged, and became separated from the side appearing in the centre as usual; many of the corpuscles became double the magnitude of others, and the strength of outline and the refractive pellucidity of the central vesicle varied exceedingly.* (Plate 1, fig. 11.)

* *Vide* a Paper in *Guy's Hospital Reports*, "On the Structure of the Blood Corpuscle," by Dr. G. O. Rees and Mr. S. Lane.

If a thin pellicle of coagulated fibrine be removed from the surface of buffy blood with the point of a needle, and a tea-spoonful of the fluid beneath it, free from red corpuscles, carefully skimmed off and put into a phial, previously nearly filled with an ounce and a-half of spring water, the mixture will become of a pale whitish colour, nearly opaque. If at the end of a quarter of an hour the mixture be examined by the microscope, numerous colourless corpuscles will be found in it, containing molecules and granules in their interior. There will also be found multitudes of isolated molecules and granules mingled with irregular masses composed of films and shreds, the remnants of ruptured corpuscular tunics. At the end of two hours a white sediment will be found at the bottom of the phial; this sediment is composed of similar objects mingled with fibres of fibrine. Here, then, a pus-like matter, composed of granulated corpuscles, isolated molecules and granules, and ruptured corpuscular tunics, may be obtained by the action of water on the elements of the buffy coat of the blood. The white colour is evidently owing to the great number of free molecules and granules.

If *dilute acetic acid* be added to recent blood corpuscles, its action upon them is similar to that of water, but more energetic. The *red corpuscles* are usually rendered darker and then dissolved (plate 1, fig. 12, *p*); frequently, however, several corpuscles appear enlarged, but very pale; they retain their usual figure, and the inner vesicle or the central portion is exceedingly obvious. (Fig. 12, *q*.) The *colourless corpuscles* lose somewhat of the regularity of their outline, and large gra-

nules appear within them. In a short time several corpuscles appear to be ruptured, and the molecules and granules are set free. (Plate I, fig. 13, *r*.) The acid sometimes produces an appearance of two dark lines inclosing a bright space, which seems to require dividing to form the granules.* (Fig. 13, *s*.)

7. The effects of *liquor potassæ* on blood corpuscles are very remarkable. In order to witness them a drop of recent blood, or of the liquor sanguinis from buffy blood, should be spread out on a slip of glass, and another slip of glass, somewhat smaller, placed upon it; a drop of the alkali added at one of the edges of the upper glass will gradually diffuse itself between them, and by a little management its progress may be followed by the microscope. At the first contact of the alkali, numerous corpuscles disappear in a moment; others explode and are dissolved. The *red corpuscles* are rendered darker, and the central matter becomes quite invisible. (Plate I, fig. 14, *t*.) I have met with many singular contortions of the corpuscles before they burst, and twice I have seen the central portion suddenly protrude itself beyond the outline of the outer tunic, and then it appeared to be drawn in again; immediately afterwards, the corpuscle for a moment regained its circular appearance, and then burst open and disappeared. (Fig. 14, *u*.) The way in which the red corpuscles discharge matter on the application of liquor potassæ, and then regain their

* See also Dr. Martin Barry's Memoirs, *l. c.*, plate 17, fig. 23, *y*; and plate 20, fig. 63, *y*; *Dujardin's Observateur au Microscope, avec Atlas*, plate 3.

form, is very curious, and may be well observed in the blood of a frog.* (Plate 2, fig. 25.)

The *colourless corpuscles* may be completely dissected by liquor potassæ or liquor ammoniæ, and the nature of their contents unequivocally displayed. Instantaneous changes occur in their interior, where numerous molecules and granules may frequently be seen in active motion. In a short time the corpuscles burst open or explode, and discharge ten, fifteen, or more molecules and granules, which either disappear quickly by dissolution in the alkali or remain for a longer time visible, according to the strength or quantity of alkali by which they have been acted on. Frequently, when the liquor potassæ is acting with diminished energy, the corpuscles give a sudden jerk, and in a moment enlarge to double or three times their former size, without losing their circular outline; the molecules and granules within them are more widely separated from each other, but not dispersed; and they are seen held together or attached to the tunic of the corpuscle by delicate connecting filaments. This singular and instructive change does not, of course, last long; the alkali continuing its action, ruptures the tunic of the corpuscle, dispersing and dissolving its contents. (Plate 1, fig. 15.)

These experiments lead to the conclusion that the colourless corpuscles are highly organized vesicles or cells, circulating in, and forming an essential portion of, the blood.

* *Dujardin's Observateur au Microscope*, plate 3, exhibits corpuscles very nearly divided in this manner by the application of a syrup.

II. ON PUS CORPUSCLES.

8. The colourless blood corpuscles appear to form pus corpuscles. An *abscess* was opened in the hand; five days afterwards the wound was discharging a colourless and transparent lymph, in which numerous corpuscles, isolated molecules and granules, and fibrinous filaments, were detected by the microscope. The corpuscles were slightly shrivelled and somewhat irregular in their outline, appearing as if a part of their fluid contents had exhaled, (plate 2, fig. 16, *v*); otherwise they had all the characteristics of the colourless corpuscles of the blood. A cautious application of the liquor potassæ caused them at first to swell out and become round, rendering the molecules and granules in their interior very distinct; they then burst open, and discharged their contents (plate 2, fig. 16,) which consisted of about ten or twelve granules and a number of smaller molecules. I may here observe, that liquor potassæ acts upon the free molecules and granules of the blood in the same manner as it does upon those which are turned out of the colourless blood and pus corpuscles. A little pus was mixed with serum of the blood; the corpuscles imbibed the fluid and became very large; numerous molecules and granules were visible within them, and they had very much the appearance and character of pollen grains which had been subjected to the action of water. (Plate 2, fig. 17, *w*.) In ten or fifteen minutes the tunics of the corpuscles partially gave way, and the molecules and granules were seen escaping. (Fig. 17, *x*.) I observed several of them enlarge suddenly with a jerk, and

the molecules and granules were seen attached to the tunic or wall of the corpuscle by delicate filaments.* (Fig. 17, *y*.)

Slight Chronic Cough.—In the mucus from the back part of the throat I found a multitude of free molecules and granules; small corpuscles with a few molecules in them; pus corpuscles of all sizes gradually passing, on the one hand, into large granulated oval or round corpuscles, and on the other, into flattened epithelial cells. Water and liquor potassæ produced upon all the granulated corpuscles the effects I have just described. (Plate 2, fig. 18.)

Chronic Scrofulous Abscess, which had existed some weeks.—The discharged matter, after having been mixed with a little water, was found to contain large corpuscles filled with molecules and granules; there were also groups of molecules and granules rather widely separated from each other, but retaining a bond of union by delicate filaments, and isolated molecules and granules, possessing vivid molecular motion. (Plate 2, fig. 19.) Pus corpuscles readily elongate themselves to pass through a narrow channel and regain their figure afterwards; I have frequently noticed this in the little currents almost always produced in the fluid, when the corpuscles are examined by the microscope between two slips of glass.

Ulcers of the Cornea and inflamed Tarsi.—In a tear from the corner of the eye a great number of corpuscles were found, in which the outline of the

* I have not always succeeded in this experiment; should it fail, add a drop of water and observe again.

inner vesicle or central portion was particularly strong and well marked; they were somewhat irregular in shape, and seemed puckered or shrivelled; in all other respects they exactly resembled the colourless corpuscles of the blood. On adding a little water they became circular and plump, and in a few minutes attained to nearly double their former size, presenting a molecular or finely granular aspect (plate 2, fig. 20); with liquor potassæ, many of them were instantly destroyed. When the first effect of this application had passed off, I observed, as the alkali slowly gained access to them, several singular changes of form and internal motions among the contained molecules, many of which became granules; afterwards, the corpuscles burst open or exploded, each of them discharging from ten to twenty molecules and granules. (Plate 2, fig. 20). Some of these corpuscles opened very gradually, and the tunic bent itself back, becoming concave the other way. (Fig. 21). A drop of blood was taken from the skin of the same person, and several colourless corpuscles were detected in it; on adding a drop of water to the blood, the red corpuscles experienced the changes before mentioned, but the colourless ones stood out prominently; previously to the addition of the water, their central portions were distinguished occupying very nearly the whole area of the corpuscles, but immediately afterwards their central portions appeared to fill the corpuscles, which became much enlarged and exhibited the same appearances as those I had taken from the corner of the eye; on adding to them a little liquor potassæ, they exploded

and discharged a number of similar molecules and granules.

Shingles.—One of the transparent vesicles was pricked, and in a drop of the effused fluid a great number of colourless corpuscles were found; some of them were remarkably large and contained several bright granules, which on close inspection were evidently moving; that is, granules disappeared in one part of the corpuscle and became visible in another part. These appearances were repeated several times, as if from the working (writhing) or undulation of a fluid within the corpuscle, which, by dividing, coalescing, and then again dividing, formed the granules, which alternately appeared and disappeared.*

A little water was added to the corpuscles from the point of a lancet, and I observed the usual effects which have been already amply described. (Plate 2, fig. 19 and 20.) A drop of liquor potassæ was then applied, and I saw the corpuscles dehisce

* The following extract from the *Journal Universel des Sciences*, may assist in explaining these singular appearances:—

"M. Plateau entretient l'Académie d'une série de faits qui l'ont conduit à considérer, comme beaucoup plus générale qu'on ne l'avait cru jusqu'ici, la propriété en vertu de laquelle certains corps mouillent d'autres corps. On savait que les solides sont en général mouillés par las liquides et par les gaz. Or, l'auteur arrive à cette conclusion que les liquides sont aussi mouillés par les autres liquides avec lesquels ils ne peuvent se mêler; que les liquides sont également mouillés par les gaz, et qu'enfin réciproquement les gaz sont mouillés par les liquides.

"C'est-à-dire que, par exemple, lorsqu'une masse liquide est plongée dans un autre liquide avec lequel elle ne peut se melée, elle maintient à sa surface une mince pellicule de ce dernier qu'elle êntraîne avec elle dans tous ses movements. La même chose a lieu à l'égard d'une bulle gazeuse qui se meut dans un liquide et enfin à l'égard d'une goutte liquide qui se meut dans un gaz. Il n'y à d'exception que pour les gaz entre eux, parce que, comme en sait, ils

one after another, giving at first a sudden start or jerk, and enlarging to twice their former dimensions before bursting open and spreading out; discharging from twelve to fifteen bright granules, and many molecules, which slowly disappeared. (Plate 2, fig. 17, 19, and 20.)

Cancer of the Breast extending to the Axilla.—The whole arm, on the affected side, had been œdematous for two months, occasionally becoming very red and painful, and the skin had been punctured several times to relieve the swelling. From one of these punctures, at the back of the hand, a clear transparent fluid had been discharging in considerable quantities for some time, and I frequently collected and examined the fluid by the microscope. On every occasion, corpuscles, resembling in every particular the colourless corpuscles of the blood, were seen in it, accompanied with a fibrinous network. When the arm had been for a few days cool and free from pain, the fluid

ne peuvent demeurer en contact sans se mêler."—*Journal Universel des Sciences*, 1*ére*, sec. No 447.

Of the same nature is the following:—We may often remark in the vicinity of falling water, and even in liquids while filtering, that spherules of the liquid run along the surface, and remain a considerable time in a state of isolation without mixing; in these instances there can be no doubt that the spherule is covered with a film of air which it carries with it in its movements, and which prevents it mingling with the mass from which it has thus become temporarily separated. The central portion of the corpuscles, spoken of in the text, *was alive*, and by virtue of this vitality it exercised certain movements, by which a division into parts ensued; and the divisions or granules were wetted with the fluid of the outer part of the corpuscle, which prevented them for a little while from coalescing, and so on; so that the phenomena observed were due to the alternate actions of an inherent vitality, and a general physical law.

discharged was as colourless as spring water, but there were always corpuscles in it; and after standing for a few hours, a delicate network of fibrinous filaments could always be drawn out with the point of a needle; the filaments of this network were so fine, and the meshes so intricately disposed, that a very large globular mass of water only appeared to be suspended on the point of the needle. Under the microscope the network was seen studded with corpuscles and with isolated molecules and granules, which had been gradually collected, or drawn together, by the contraction of the filaments of fibrine. When the arm became red and painful, the fluid discharged from the puncture had the ordinary straw colour of serum; there were many more corpuscles in it, and the fibrinous network was more dense. On the addition of water the corpuscles imbibed and swelled, and on subjecting them to the test of liquor potassæ they dehisced and discharged molecules and granules. It is evident then that the fluid of œdematous swellings differs materially from the serum of the blood, remaining after the formation of the clot in an ordinary venæsection; for it contains both colourless corpuscles and fibrine. The corpuscles discharged from the open cancerous sore possessed the usual characteristics of ordinary pus corpuscles, and their behaviour, on the addition of water and liquor potassæ, was precisely similar.

The conclusions to which these experiments lead are, that pus corpuscles of all kinds are altered colourless blood corpuscles; and that all limpid,

colourless, abnormal discharges are effusions of the liquor sanguinis, containing more or less of the fibrine, and corpuscles in varying proportions. No new elementary particles are formed by any inflammatory or diseased action.*

III. ON THE BLOOD CORPUSCLES AND ON THE LYMPH GLOBULES OF THE FROG.

9. The colourless or lymph globule in the blood of the frog is analogous to the colourless corpuscle in the blood of man.

If an incision be made in the skin of a frog, a clear liquid will be effused, which, when examined by the microscope, will be found to contain two kinds of corpuscles; the one the red corpuscle, the other the lymph globule. The effect of water on the lymph globules is precisely similar to that which it produces on the colourless corpuscles of the blood of man: they imbibe the fluid, and increase in size, molecules and granules being distinctly visible in them. If a little liquor potassæ be added, it immediately causes a commotion in the molecules and granules, and in a few moments the globules burst open one after another, and discharge from thirty to fifty molecules and granules, which increase in size previous to their dissolution in the fluid. (Plate 2, fig. 25, *d*.) After a little time the alkali becomes weaker in its effect, appearing to have only strength sufficient to burst the globule; the granules consequently remain for a long time visible, separated a

* Müller, "On the Nature and Structural Characteristics of Cancer," pp. 24, 25, and 32, 1840.

little from each other, but still held together by delicate filaments. (Par. 7.)

The great number of molecules and granules which are turned out of the lymph globule of the frog by liquor potassæ is quite amazing; the rapidity with which they imbibe the fluid, and their subsequent destruction and disappearance, are eqnally singular. I have no doubt that higher microscopic powers than I have been able to use would show an equal amount of molecules and granules from the colourless corpuscles of man; but these are so exceedingly minute that their actual number escapes notice, the larger ones only being accurately defined.

10. This lymph globule appears to be the inner vesicle or central portion of the red corpuscle.

In blood just taken from the vessels, the inner vesicle or central portion of the red corpuscle is not visible, though there is considerable difference in this respect in different corpuscles. (Plate 2, fig. 22, a^1.) In a very short time, however, and especially if the blood be allowed to dry on the glass, the inner vesicle becomes very distinct, having the oval figure of the outer one; its outline is irregular, and there are indications of a tendency to divide into granules. (Plate 2, fig. 22, b^1.) The effect of water on the recent and on the dried corpuscles is different. When it is added to the recent red corpuscles its effect upon them varies; and it would be almost impossible to particularize all the appearances they present. Some of the corpuscles are but little altered, a few are rendered circular and dark, but the majority become circular and pale,

the inner vesicle also appears globular and very distinct. In some instances this inner vesicle has a finely granular appearance; in others it is evidently composed of granules, when it strongly resembles the lymph globule. (Plate 2, fig. 23.) If the dilute acetic acid be added to the recent red corpuscles, the outer vesicle is rendered very pale, and the inner vesicle becomes remarkably distinct. Having added a drop of the dilute acid to corpuscles which had previously been rendered pale and globular by water, I observed the pale outer vesicle enlarge suddenly, and at the same time numerous molecules and bright granules became visible in the globular inner vesicle, giving to it the most perfect resemblance in all points to the lymph globule. (Plate 2, fig. 24.)

A drop of frog's blood having been spread out on a slip of glass and allowed to dry, the corpuscles were examined by the microscope and the inner vesicles were found very distinct. I selected seven corpuscles lying together (plate 2, fig. 26, e^1); a little water was added to them, and the outer vesicles were instantly destroyed and disappeared, but the inner vesicles or central portions of the corpuscles remained, and began to enlarge by imbibing the fluid (fig. 26, f); and I counted from twelve to twenty molecules in them, which with higher power (500) appeared as bright granules with a dark refractive central spot. Some of these inner vesicles were round, and resembled the lymph globule, others retained an oval shape. (Plate 2, fig. 26, f^1.) On adding to them, very cautiously, a little liquor potassæ, they enlarged suddenly with a jerk, their

outline remained for a moment or two faintly visible, and they had all the appearance of a network of granulated cells. (Fig. 26, g^1.)

These experiments appear to show that the lymph globule of the frog is the inner vesicle or central portion of the red corpuscle, and that its structure is similar to that of the colourless blood corpuscle of man. Hence, then, we have strong ground for concluding that the colourless blood and pus corpuscles of man are formed from the central portion of the red corpuscles; this central portion becoming developed, and increasing gradually in size by absorbing or assimilating the colouring matter.*

IV. ON INFLAMMATION.

11. It is well known that the lymph globules of the frog are disposed to adhere to the sides of the vessels along which they are passing, and that the red corpuscles pass by them, losing their figure.†

The following experiments will show that this disposition is very much increased in vessels that have been irritated or excited, when the lymph globules become so numerous as to line the whole interior of some of the vessels, while the current of the red corpuscles passes over them.

* I may observe, that Professor Owen's account of the blood corpuscle of the Siren, (*Penny Cyclopædia*, Art. "Siren,") fully bears out the view above given of the nature and structure of the central portion or inner vesicle of the red corpuscle of the frog; and strengthens the probability of the lymph globule being this inner vesicle arrived at maturity.

† Wagner; *Icones Physiologicæ*, Fasciculus 2, table 14, fig. 5, *a*, *a*, *a*.

The circulation in the web of a frog's foot was watched at intervals for half an hour, and only a few lymph globules were seen. A crystal of salt was applied, and the examination continued: its first effect was to quicken the rate of the circulation; this soon ceased, and the blood became stationary, the vessels being red and congested. In the capillaries contiguous to the congested vessels, the blood was oscillating to and fro; a little further off, the circulation was very quick. In half an hour the number of lymph globules had increased considerably, and the circulation in the congested vessels was resumed; but the corpuscles passing through them sometimes oscillated to and fro, sometimes retrograded, and at others hurried or darted through the vessels with the utmost velocity. The current of the red corpuscles, in some of the veins, appeared to be confined to the centre of the vessel, and not to touch the circumference, which was occupied by a great many lymph globules.* On the following morning the whole interior of the inflamed vessels appeared to be lined with lymph globules. By gently altering the focus of the microscope they were seen below the red current, and many of them appeared to lie externally to the boundary of the vessels.† (Plate 3, fig. 27.) Every now and then lymph globules were detached from their situation, rolling slowly onward with the red current, fresh ones taking their place.

* "Report on the Results obtained by the use of the Microscope in the Study of Human Anatomy and Physiology," by Mr. James Paget; *British and Foreign Medical Review*, Art. 15, c. Capillaries; 3, Functions, &c.

† Wagner; *Icones Physiologicæ*, Fasciculus 2, table 14, fig. 3, 4, & 5.

The circulation in the web of a frog's foot was watched for a quarter of an hour, and only six lymph globules were seen: the foot was then placed in water, at 94° F., for 30 seconds. After the immersion the circulation was proceeding at very different rates in different capillaries: in some it was quicker, in others slower, than before; the lymph globules gradually increased in number, and in some of the veins the red current appeared as if passing over a bed of marbles; one capillary was particularly noticed, nearly filled with lymph globules, oscillating to and fro, while at the same time red corpuscles were threading their way between them, passing *through* the vessel: occasionally these red corpuscles stopped suddenly and retrograded, yet no motion whatever could be detected in the wall of the vessel.

Several other experiments afforded, similar results. In repeating these experiments it is necessary to observe, that any rough handling in securing the foot to the plate produces an effect on the circulation, and that lymph globules will accumulate in the vessels, from the irritation excited by this operation.

12. The lymph globules seen in the blood in these experiments were not all of the same dimensions: some were nearly twice the size of others; molecules could readily be detected in many of them, and both molecules and granules in others. During some of these experiments the islets of tissue between the capillaries became distinctly cellular, and appeared as if overspread with irregular shaped lymph globules* (plate 3, fig. 27, b^3), and the

* Wagner; *Icones Physiologicæ*, Fasciculus 2, table 14, fig. 3.

various rates of circulation, which were seen in the same field of view, were very remarkable, showing that local causes may not only retard, but greatly accelerate, the motion of the blood over limited areas. Red corpuscles were frequently observed following each other with the utmost rapidity through vessels large enough to admit three or four abreast, and yet no movement whatever was discernible in the sides or wall of the vessel. It was frequently noticed, that red corpuscles were seen to be detached from a mass of blood almost stationary in a capillary, and after darting through three or four vessels, to arrive at another slowly moving mass; the intermediate movements being much quicker than those at the points either of departure or arrival.

The phenomena observed in the foregoing experiments corroborate the views of those distinguished physiologists who entertain the opinion that the capillary distribution of the blood is situated in channels of the tissue, and not in vessels with a distinct membranous coat.* Wagner observes, in speaking of the capillaries in the web of the frog's foot, that they are bounded by distinct walls, "*Parietibus distinctè circumscripta sunt,*" but he does not explain their nature or character.† These walls, bounding the capillary currents, become much more evident and more strongly defined in the inflamed vessels; they appear, however, to consist of parallel fibrinous fibres (par. 5), which gradually amalgamate with

* *Müller's Physiology*, vol. i., 229.

† *Icones Physiologicæ*, Fasciculus 2, table 14, description of fig. 2.

the structure of the tissue, as they recede from the currents of the blood; and it is among these fibrinous looking fibres that the lymph globules are seen to accumulate.* (Plate 3, fig. 27.)

13. It may perhaps be questioned whether the term inflammation be applicable to cold-blooded animals. Dr. Martin Barry has shown that various altered forms of blood corpuscles accumulate in the minute vessels engaged actively in the function of nutrition;† and he has used the term "vital turgescence" to express a peculiar condition of the vessels in which this accumulation has taken place.

My experiments have shown that the colourless forms of blood corpuscles accumulate in the minute vessels engaged in inflammation: hence I conclude, that "vital turgescence" and "inflammation" are terms expressing analogous actions; for blood drawn during pregnancy, where there is an extensive vital turgescence, exhibits the buffy coat; and so it does in pneumonia and rheumatism.

A vital turgescence (the modelling process of Macartney) consists in a normal accumulation of colourless corpuscles for the purposes of growth, nutrition, or reparation; and the various degrees of inflammation are states of abnormal turgescence, in which the corpuscles, over and above what are required for normal purposes, form pus corpuscles. (Par. 8.)

* The structure and formation of blood vessels out of filaments of fibrine, inclosing elongated or spindle-shaped colourless blood corpuscles, may be demonstrated in the transparent membranes of a very young embryo.

† *Philosophical Transactions*, part ii., pp. 47 and 48, &c., 1840; and part ii., p. 106, 1841.

V. ON CELLS.

14. In the lower orders of vital structures, where there is no circulating current, the granulated cells of the tissue are parent cells, exercising a reproductive function. Dr. Barry, in his *Researches in Embryology,* has described, in the interior of the cells of the impregnated ovum, "minute objects," the "foundations of future cells," which, escaping from the original or parent cells, form additional new ones.*

The minute objects, visible in the interior of the colourless blood corpuscles, and termed by me, as before mentioned, molecules and granules, have been investigated by Dr. B. under the denomination of blood discs; he believes that the colourless blood corpuscles are parent cells, and that the objects (discs) contained in them being discharged into the blood become young blood corpuscles.† There can I think be no doubt, in the higher order of animals, where there is a circulating current of cells, that the reproductive function, or the formation of new cells, and the first stages of their development, are performed in and confined to the circulating fluids, the chyle or the blood; and that the tissue or epithelial cells have not the power of reproducing their kind.

The term "parent cell," therefore, if at all appropriate to the colourless corpuscles of the blood, is not applicable to those which, having been withdrawn out of the circulating current in the manner

* *Philosophical Transactions,* 1839 and 1840.

† *Ibid,* 1842, part i., par 109.

already adverted to, become pus corpuscles (par. 8); nor, as I shall endeavour to show, to those forming the normal tissue cells, which retain the molecules and granules in their interior, not, as I believe, for the purpose of forming new cells, but to assist in some special function, to the reproduction of which they are essential elements.

15. Before proceeding to show that the colourless blood corpuscles form the tissue or ephithelial cells which elaborate the various secretions, I shall make a few remarks in support of the following propositions:—1st, that each cell performs its own function quite independent of those by which it is surrounded; 2nd, that the magnitude of a cell, the thickness of its wall, and the size of its nucleus, have no necessary connexion with the sensible qualities of the secreted matter, but that it is the molecules and granules, in its interior, which give special qualities to the secretion, or to the contents of a cell.

The isolated character and independent function of the cells of vegetable structures, might almost be inferred from the variety of products found not only in the same plant, but in the different parts of a similar structure, *e. g.*, the flower and the fruit. If a succulent fruit be bruised, a change of colour in the injured part almost immediately ensues, even although the cuticle remains entire. The injury ruptures the cells of the interior pulp, and causing their contents to mingle, produces rapid changes, ending in decay.

If the cuticle be removed from one of the surfaces of a coloured petal, the parenchyma, after having been moistened with a drop of water and examined

by the microscope, will be found elaborately formed of cells, the size and figure of each cell varying in the different species of plants. (Plate 3, figs. 28, 29, and 30.) These cells are composed of a delicate transparent membrane, having a notched, waved, or undulating outline. Affixed to the angles or projecting points of the membrane, or irregularly distributed within the cells, are numerous molecules and granules, varying in number, but seldom less than fifteen or twenty. In a parti-coloured petal—for example, the *Garden Pansy*—(plate 3, fig. 28), each cell may be seen to possess its own colour, without the least intermixture with that of the adjoining ones. Cells filled with a purple pigment are in juxta-position with others filled with a brilliant yellow; and cells with these colours may be seen in apposition with others of a pale primrose, or with others devoid of colour. It is evident, from this examination, that the differences of colour arise from the peculiar and independent function of each cell; the purple pigment is formed in one, and the yellow in another, so that there is no intermingling of tints; each coloured cell is perfect and distinct in itself. The nucleus of the cell may generally be seen adhering to the transparent membraneous wall (figs. 28 and 30); and, from the form and situation of this body, it appears to be the nutrimental organ of the cell wall: it is usually composed of a central matter, surrounded by minute molecules.

The various species of *Conferva* are composed of exquisitely formed granulated cells (plate 4, figs.

32 and 33), possessing a power of reproduction;* and the fleshy leaves of *Sedum acre* afford beautiful examples of perfectly independent vesicles or cells, with thin walls, and apparently no nucleus or special nutrimental organ, but which contain a great number of large green granules, each granule having smaller objects in its interior. (Plate 4, fig. 31.) This plant will flourish on the bare rocks exposed to the hot sun, yet its fleshy leaves are very juicy, (evincing great activity of function), and have very strong sensible qualities.† The cells of the pith at the extremity of the young and tender shoots of the elder, *(Sambucus niger,)* are nearly filled with molecules and granules, which gradually diminish in number towards the older portions of the branch, and ultimately disappear when the wood is completely formed. In the former situation, the cells of the pith have strong sensible qualities, whereas in the latter they are altogether insipid. In these examples it is much more probable to suppose, that the reproductive function of the *Conferva,* and the hot and biting qualities of the *Sedum,* reside in the

* Carpenter's *General and Comparative Physiology,* p. 447, &c.

† La cellule pendant sa période de développement, est remplie d'un liquide incolore plus ou moins chargé de substances organiques ou inorganiques dissoutes, et quelquefois même d'un liquide colorè..... Si la cellule est exposée à l'influence de la lumière, elle sera, dans certains cas, mais non toujours, tapissèe a l' interieur par des expansions vertes ou par une couche de *petits granules* verts plus ou moins rapprochès, mais non superposés, ni entassés, qui sont la matière verte des végétaux, nommèe *l' endrochrôme,* ou *la chromule* ou *la chlorophylle,* et douée d'une vitalité propre, et d' une organisation non appréciable a la vue, mais bien réelle.—*Dujardin, loc. cit.,* chap. 3, pp. 172, &c.

very conspicuous and highly-organized granules of the cell, rather than in the thin, transparent, and almost invisible membrane forming the cell wall.* Again, in the cultivated fruits, the cells are inordinately increased in magnitude, and distended with a much blander or more watery fluid than in their natural uncultivated state. The nucleus of the cells is very much enlarged, but the granules of the cell are small and ill defined, as in a thin section of the fruit of the strawberry. (Plate 4, fig. 34.) In the fruit of the sloe, *(Prunus spinosa)*, the cells are comparatively small, possessing numerous green granules; whereas in the fruit of the cultivated varieties of the plum the cells are larger, and have much fewer and paler granules.

The cells of vegetable structures, therefore, appear to perform perfectly independent functions; and the sensible qualities of the contents, and the nature of the function of a cell would seem to depend, not upon the thickness or development of the membrane of the cell, nor on the size of the nucleus or nutrimental organ, but upon the number and structure of the molecules and granules in its interior.

The very close analogies which have been shown to exist between the structure and functions of vegetable and animal tissues, by the admirable researches of Schleiden and Schwann, render it unnecessary for me to adduce any additional arguments to show that the foregoing conclusion is

* See Dr. Barry's remark; *Philosophical Transactions*, 1842, part i., par. 90.

applicable to the various cells of animal structures.* That all the secretions of the animal tissues are formed in the interior of vesicles or cells, is a result which has been already advanced, and ably illustrated and supported, by the researches of Mr. Goodsir ;† and it further appears that these secretions are elaborated, and their sensible qualities determined, by the molecules and granules in the interior of the cells.

16. Granulated vesicles or cells, having a diameter of $\frac{1}{1000}$in. are very conspicuous in the liver (plate 4, fig. 35) ; they compose a considerable portion of the bulk of this organ, and from ten to thirty molecules and granules may be counted in the interior of each cell.‡

When water is added to these granulated vesicles, they become larger and their outline less distinct. The dilute acetic acid renders an *inner* vesicle or central matter, containing molecules and granules, exceedingly conspicuous, and similar objects are also seen distributed in the outer portion of the vesicle; liquor potassæ also renders a central

* As these sheets were passing through the press I saw the October No. of the *Microscopic Journal*, containing "Researches on the Structure of Hairs," &c., by G. Busk, Esq., from which I extract the following—"Hairs are furnished in the interior with distinct, regular, colour cells, in which only is the colouring matter of the hair deposited. In the white hair of the rabbit the cells will be observed to be 'quite empty;' in a hair partly black and partly white, some of the cells are empty ; while others are more or less filled with black matter."

† *Transactions of the Royal Society of Edinburgh*, 1842.

‡ It appears to me that Dr. Barry has figured these vesicles with their contained objects, (*Philosophical Transactions*, part ii., 1841, plate 17, fig. 35.) He notices their full yellow colour, (par 84), which I have more than once seen in the vesicles of a diseased human liver.

portion, with numerous molecules and granules, very evident, but in a few minutes they fade away and disappear.

It is impossible to adduce any direct proof that the granulated vesicles of the liver are formed from colourless blood corpuscles, but the details of their structure render the supposition by no means improbable; and the following cases and observations, showing the gradual transition of these corpuscles into the most complex forms of epithelium, afford strong ground for believing that such may be the fact. In the following case, pus corpuscles, or half-formed epithelial cells, were seen furnished with active vibratile cilia, the normal appendage to the perfect cell.

Catarrh, (Hay Fever,) accompanied by great irritation and coryza, with a copious discharge of a clear limpid fluid from the nostrils. Having received a drop of this fluid on a slip of glass, a great number of corpuscles were found in it, exactly resembling in all particulars the colourless corpuscles of the blood; they burst open, and discharged molecules and granules on the application of liquor potassæ. These corpuscles were of different sizes, forming a regular series, passing gradually through several varieties of pus corpuscles or granulated vesicles, into the ciliated epithelium of the respiratory passages. A great majority of these corpuscles were provided with vibratile cilia, in a very active state; not only were the vibratile cilia, fringing the circumference, moving, but the whole interior of many of the corpuscles was in a state of agitation; molecules and granules were continually

shifting their position, and in some of the corpuscles an undulatory kind of motion was very perceptible.

Plate 5, fig. 38, exhibits the form and appearances of the corpuscles, which were drawn while the objects were still under examination by the microscope.

(*a.*) Colourless corpuscles, resembling in every respect the colourless blood corpuscle.

(*b.*) Various granulated corpuscles, larger than the blood corpuscles.

(*c.*) A large corpuscle with a notch in the circumference, which frequently changed to the excentric granule shown in the figure below, and this again changed to the notch, and so on several times.

(*c.*[1]) The vibratile cilia, extremely active.

(*d.*) Various granulated corpuscles, with vibratile cilia, in active motion, and in

(*d.*[1]) The interior of the three corpuscles seen joined together, was actively moving, as well as their vibratile cilia.

(*e.*) Corpuscles, with active cilia gradually passing into epithelium.

(*f.*) Epithelium, with active cilia.

I had several opportunities of verifying these results; and on many occasions, by careful inspection by the microscope, I have seen corpuscles with vibratile cilia, among the granulated vesicles and epithelial cells, brought by an effort from the throat; and sometimes the cilia and the

interior of these corpuscles have been observed moving.* The gradual transition from corpuscles, resembling in all particulars the colourless corpuscles of the blood, through various forms of granulated vesicles or pus corpuscles, into epithelial cells, may be witnessed in all the secretions of mucous membranes; and a microscopic examination of the particles, continually exfoliating from the skin, will convince any one that the scales of the epidermis differ in no respect from the epithelium of mucous membranes, except in the alterations produced by exposure to the air.

The cases, however, which afford the most instructive and interesting examples of the gradual transition of the colourless blood corpuscles, through the form of the pus corpuscle, into the normal epithelial cell of the tissue, are familiar in every surgery. Frequently, after considerable pain and inflammation in the skin, usually of the hand or of one of the fingers, and arising from various causes, the cuticle becomes raised into a large bulla, or bag, containing what has hitherto been considered unhealthy pus, *i. e.*, a quantity of watery or serous fluid full of white flakes; if these white flakes be examined by the microscope, they will be found to consist of half-formed epithelium, ; every variety of granulated vesicle, from those agreeing in all particulars with the colourless corpuscles of the blood, discharging molecules and granules on the application of liquor potassæ, to others resembling different kinds of pus corpuscles, and from these

* *Philosophical Transactions*, 1841, part ii., p. 226, pars. 124, &c.

again to others so large as to measure $\frac{1}{800}$in. in diameter; and several varieties of epithelium may be readily detected.

The incipient epithelial cells, in many instances, were already joined side by side and elongated, forming a regular pavement; in addition to the numerous molecules and granules in their interior, a central matter may be detected in all stages of growth, forming an incipient nucleus or nutrimental organ for the strengthening and further development of the wall of the cell; on adding liquor potassæ to these objects, it caused all the smaller granulated cells or colourless blood and pus corpuscles to enlarge and explode in the manner already pointed out; but it appeared to have more difficulty in acting on the larger ones, in which the incipient nucleus is already formed; and in the perfect epithelial cells, where the nucleus was well developed, and where the wall or tunic of the cell may be supposed to be strengthened, it was a long time before any effect was produced.

These experiments and observations, together with the facts mentioned in a former part of this memoir, viz., the increased amount of the colourless blood corpuscles in vessels actively administering to nutrition, or engaged in any inflammatory process; their abundance in all the spots or patches of cutaneous diseases, and their accumulation in the vessels of the skin, in cases of scarlet fever, where they may be found in great numbers prior to the exfoliation of the cuticle (par. 2), almost necessarily

lead to the conclusion, that *all the varieties of epithelial cells are formed of colourless blood corpuscles.*

This conclusion appears to be substantiated by the following considerations: first, *liquor potassæ* causes all the white or colourless corpuscles, which are known under the denomination of "exudation corpuscles," and all the varieties of pus corpuscles, to discharge precisely similar objects to those discharged by colourless blood corpuscles; there is no difference whatever, in this respect, between the colourless corpuscles or globules from the surface of inflammatory blood, and those from the transparent vesicles of *herpes labialis*, or from the serum of a blister. Secondly, the fibrine, when coagulating, forms fibres or filaments, which entangle in their meshes all the previously existing molecules, granules, and corpuscles, and by their extraordinary contractile power draw them together. The fibrine has never been observed to form a granule, globule, or corpuscle, of any kind, although it has many times been carefully watched during coagulation by the microscope; and the minute particles, resulting from the coagulation of the albumen of the serum, are entirely distinct from the molecules and granules, either of the chyle, of the blood, of tubercle, or pus. If additional proof be required to show that the colourless blood corpuscles form the various tissue or epithelial cells, it appears to me to be contained, thirdly, in the facts so elaborately adduced by Dr. Barry himself, in his memoirs on "The Corpuscles of the Blood;" and fourthly, in the important researches of Dr. Gruby, which have recently been

presented to the English reader, in the pages of the *Microscopic Journal,* by Dr. Goodfellow.*

17. I am not aware that any attempt has been made to show that the molecules and granules in the interior of the tissue, or epithelial cells of the higher orders of animals, are reproductive objects or young cells; and the question to be determined would seem to be, whether the reproduction of blood cells takes place in the chyle or in the blood. What is the nature and destination of the molecules and granules of the chyle or of the blood? Dr. Barry speaks of the latter, and calls them "*young blood discs,*" which have been discharged from their "*parent cells,*" the colourless blood corpuscles.† If this interpretation be true, then it is evident, from the preceding researches, that the colourless blood corpuscles perform two distinct functions: the one as "parent cells," and the other as "tissue cells." It has been shown that the function of reproduction is very closely allied to that of nutrition, and that in many of the lower orders of vital structures the two functions are united in the same cell.‡ It is therefore extremely probable that a certain number of the colourless corpuscles, while circulating in the blood, discharge their contained granules into this fluid, which become young cells, while those corpuscles which are drawn

* "Microscopical Observations on the Pathological Morphology of some of the Animal Fluids," by David Gruby, M.D.; translated from the Latin by S. J. Goodfellow, Esq., M.D., &c.

† *Philosophical Transactions,* 1842, part i, "On Fibre," par. 109.

‡ "Principles of General and Comparative Physiology," by Dr. Carpenter, par. 585.

out of the circulation by the tissue, lose their reproductive power by ministering to the nutrition of the organism; assuming different forms, and performing different functions, in subjection to the primitive law of the development of the tissues.

The minute objects or organised molecules, visible in the interior of all epithelial cells, are very similar to those seen in the interior of reproductive cells; but this similitude, there is every reason to believe, may arise from the insufficiency of our means of observation, and ought not therefore to be considered as indicating a similarity of function. The illustrations which have already been adduced (par. 15), appear to show that the molecules and granules, in the interior of the tissue cells, are essential to the functions of the cell, giving sensible qualities to its contents; and there is every reason to believe that they are not "germs," or "young cells."

I had often remarked the very great similitude of size and appearance between several of the smaller forms of the polygastric animalcules and some of the varieties of pus corpuscles; so great is this similarity, that in many instances it would have been difficult to distinguish the one from the other, had it not been for the voluntary and very active movements of the animalcules. Now liquor potassæ produces upon these animalcules the same effect as it does upon the colourless blood and pus corpuscles: it penetrates the transparent integument of the animalcule by imbibition, and causes it to burst open and discharge its contents, which have the same appearance as the molecules and granules

from the colourless blood and pus corpuscles. In the larger forms of the polygastric animalcules there are a great number of large vesicles or cells (*which have been called stomachs*), very visible in their interior; and these are all discharged from the bodies of the creatures in the same way when they are submitted to the action of liquor potassæ. These so-called stomachs may be seen enlarging in the interior of the animalcule prior to the rupture of the external integument; and when they are discharged from the body of the animalcule, numerous minute molecules may be seen within them.*

The pollen-grains of phænogamous plants, and the spores of the epiphyllous fungi, imbibe water, enlarging more or less in size, altering their figure, and becoming nearly transparent. Their contents appear very similar to those of the colourless blood corpuscles and of the polygastric animalcules; under the influence of liquor potassæ, they give a sudden jerk, increase in size, and in a short time burst open or explode, discharging an immense quantity of molecules and granules. The pollen-grain of the common lilac (*Syringa vulgaris*), (plate 4, fig. 36, *a*,) after having been moistened first with water and then with liquor potassæ, measured from $\frac{1}{860}$in. to $\frac{1}{900}$in.; and I have counted in some of them from 12 to 15 granules stretching across it, (fig. 36, *b*); hence the diameter of these granules are from $\frac{1}{10,000}$in. to $\frac{1}{15,000}$in.

The bursting of the pollen-grain under the in-

* The *paramœcium chrysalis* and the *vorticella convallaria* are well adapted for the verification of this very singular and highly instructive result: the former animalcule always revolves rapidly on its long axis before it bursts, and the latter assumes a globular form.

fluence of liquor potassæ, and the attendant phenomena, vary in different species of plants, and also in different grains from the same plant. Many of them discharge their contents through a large rent, and the molecules and granules are widely dispersed (plate 4, fig. 36, *c*); others eject them from a smaller orifice, and the molecules and granules sometimes come out in a long tube-like, or, as Raspail describes it, "gut-like" form. (Fig. 36, *d*.) Frequently after the application of the alkali, very light coloured transparent projections are visible, extending some distance from the dark outline of the grain, as if a thin membrane were distended* (fig. 36, *e*); and sometimes the grain bursts, so as to exhibit the appearance of two or three tunics.

These experiments certainly indicate a very remarkable similarity in the contents of the colourless blood corpuscles of man, the lymph globules of the batrachia, the pollen of phænogamous plants, the reproductive cells and spores of the cryptogamia, and *the stomachs* of the polygastric animalcules; they show that all these objects are cells containing particles so minute that the microscope fails to indicate in them any distinction of parts. These particles, which I have called molecules and granules, although varying in size, are therefore similar in appearance to one another, and to those seen in the interior of the various tissue cells; yet we are perfectly assured of their very different nature and functions. Among the many wonderful and beautiful objects displayed by the micros-

* I have frequently seen similar projections from the body of the *paramœcium*, under the influence of liquor potassæ.

cope, there are none exceeding in variety and interest the ova and the bundles of seminal animalcules of the common earth-worm (*Lumbricus terrestris*); and from their size they are admirably adapted to display the singular effects of liquor potassæ. Mingled with these objects are numerous cells, containing in their interior dark and well defined molecules, in the greatest state of activity; they are continually shifting their position within the cell, presenting exactly the same appearance as those which I observed in the colourless corpuscles or cells from the case of *catarrh,* previously related (par. 16.) (Plate 5, fig. 38, *d.*[1]) On the application of liquor potassæ, all these molecules were quickly ejected, and their restlessness and motions, after they were discharged from the cell, were very singular; but not more remarkable than the motions of the molecules discharged from the lymph globules of the frog, or from the colourless blood corpuscles and pus corpuscles of man. Now it matters little what terms may be employed to designate these minute objects, which the microscope exhibits under a similar aspect from such various sources, but it is very important to bear in mind that this similarity of aspect does not imply a similarity of function; and that although, in many instances, molecules and granules are reproductive objects, they may not be so in all cases.

18. The following is a recapitulation of the points which appear to have been established, partly by the observations of others, and partly by the foregoing experiments.

The blood contains red corpuscles, colourless corpuscles, and minute granules, all of which possess a certain degree of independent vitality, and represent different stages of the same object, viz., the blood-cell, which may be considered as undergoing a regular series of changes, until at length it becomes colourless and filled with granules.* These granules, as long as the cells containing them remain isolated from the tissue, (swimming in the plasma or liquor sanguinis,) possess the usual endowments of those granules seen in the interior of other simple cells, *i. e.*, they are reproductive objects or "germs;" but when the cell becomes fixed to, or *planted* in, the tissue of a compound structure, it alters its form, and the granules in its interior lose their reproductive or simple cellular function, which merges into a secretive or nutritive function for higher purposes, under the controul of the general law regulating the development of the tissues of

* At one period of their development, blood-cells have a peculiar and much stronger attraction for each other than for the tissue bounding the channels in which they circulate, and this attraction disposes them to cohere and keep together; at a subsequent period they lose this property, and the mature or colourless cells evince no tendency of the kind; on the contrary, they have a much stronger disposition to adhere to the tissue than to their fellow cells (par. 2 and 11), and they are thus disposed, as it were, to be drawn out of the current of the circulation. The disposition of the red corpuscles to congregate and cohere, and the indisposition of the colourless corpuscles to do so, may be frequently well seen by examining a minute drop of inflammatory blood before the formation of the colourless layer at the top is completed. After a certain interval, red and colourless corpuscles are mingled in equal proportions, and the behaviour of the two kinds is well shown. During this examination the molecules and granules will be seen congregating in various places, before the appearance of the fibres of fibrine.

the more complex organism, to the stability of which they are now become essential elements.

We thus recognise two very distinct epochs in the career of cells, during the former of which, they circulate independently in the blood; and during the latter, are fixed to and form part of the tissue, and there can be no doubt, that the series of changes and developments of *blood-cells* may be normal or abnormal, as well of those of the *tissue-cells*. With respect to the healthy or unhealthy characters of the former, we yet know nothing, and our knowledge of the peculiar characteristics of disease in the latter, is very small; the following general remarks appear to be all that can at present be affirmed respecting them.

If cells pass through *all* the stages of their growth with a certain degree of activity and in due subjection to the law of the structure, nutrition and healthy functions are the natural results; any local accumulation of them, these conditions being fulfilled, constitutes a "*vital turgescence*," and an increased activity of function, with an increased desire for food, ensues; but if from any cause they do not experience their normal changes within a certain period, or with a certain degree of rapidity, nutrition is arrested, and impaired functions, with loss of appetite, are the attendant phenomena. If cells congregate in particular tissues, from their excess in the circulating fluid, or from any accidental circumstance, then this accumulation constitutes an "*inflammatory turgescence*," and the function of an organ may be destroyed by an abnormal nutrition; the cells being in excess, and

having their usual development and growth partially or wholly arrested, form pus corpuscles; or, exercising their own inherent vitality, uncontrolled by the assimilative law of the tissue, give origin to specific forms of disease.

Note.—The reader will find at the bottom of plate 4, fig. 37, the following objects drawn correctly from the microscope to a scale, so that their average magnitudes and appearances may in some degree be appreciated:—

(*a.*) Molecules and fibres of fibrine, $\frac{1}{100,000}$in.
(*b.*) Granules, and a few fibres of fibrine, $\frac{1}{10,000}$in. to $\frac{1}{20,000}$in.
(*c.*) The red corpuscles of the blood, $\frac{1}{3800}$in.
(*d.*) The colourless corpuscles of the blood, $\frac{1}{2600}$in.
(*e.*) Pus or granulated corpuscles, $\frac{1}{1500}$in.
(*f.*) Granulated cells or vesicles, from the liver, $\frac{1}{1000}$in.

VI. ON THE AËRIFEROUS STRUCTURE OF THE LUNGS.

19. The nature and primary seat of tubercles cannot be comprehended unless the anatomy of the aëriferous structure of the lungs be understood. The opinions of anatomists have been much divided as to the manner in which the bronchial tubes terminate, whether in a series of communicating cells, or in a single "*cul de sac*;" the latter opinion, founded on the results of Reisseissen's investigations, prevails. Malpighi was the first to describe the air vesicles of the lungs and the air tubes ending in them. Helvetius attempted to prove that these

Malpighian vesicles were nothing more than common cellular tissue diffused without order through the lungs, and that the inspired air, proceeding thither through the minute air tubes, not only passes easily from cell to cell, but likewise from the lobules into their interstices, and finally diffuses itself through the whole lung. Haller adopted these opinions of Helvetius;* but Reisseissen, in his work, *De Fabrica Pulmonum,* controverts them, and proves that the cells of each lobular subdivision of the lungs have no communication with those of the adjoining ones in the manner of cellular tissue; and he concludes, from his experiments, that the air cells are *culs de sac* terminations of the air tubes, and perfectly independent of one another.† Cruveilhier, however, describes the air cells as freely communicating with each other in the interior of the lobules.‡ At an early period of my investigations I remarked that no bronchial tubes could be found ending in a *cul de sac*; on the contrary, communicating air cells were readily seen with a lens in every section of the lungs. Several of Reisseissen's experiments were therefore repeated, and others instituted; from which ample evidence was derived that the bronchial tubes, after subdividing into a multitude of minute ramifications which take their course in the cellular interstices of the lobules, terminate in their interior in symmetrically branched air passages and freely communicating cells.

* Haller (*Von Albert*); *Elementa Physiologiæ*, "*Cap. de Respiratione.*"

† Reisseissen; *Op. cit.*, p. 6, &c.

‡ *Cruveilhier's Anatomy*, vol. i., by A. Tweedie, M.D., F.R.S., p. 552.

In the fœtus the lungs lie at the back part of the chest, not occupying more than one-half or a third of its cavity, and neither air vesicles nor air cells can be detected in them. The ultimate bronchial sub-divisions are tubular; they have a regular branched arrangement, ramifying symmetrically in all directions, and terminating in closed extremities, which are generally situated at the boundary of the lobules. (Plate 5, fig. 39, *a*.) But when an animal has respired, the entrance of the air into the lungs distends the lobules to twice or three times their fœtal dimensions; they now occupy the whole interior of the chest, and the ultimate bronchial sub-divisions experience a great and important change: the delicate membrane composing them offers only a feeble resistance to the pressure of the air, and it is consequeutly pushed forward and distended laterally into rounded inflations (plate 5, fig. 39, *b*), forming a series of communicating cells, which, meeting on all sides those of the adjoining sub-divisions, are moulded by pressure against each other into various pentagonal and hexagonal forms. (Plate 5, fig. 39, *c*.) The cells thus formed are immediately occupied by minute air bubbles, in the multitude of which all trace of the symmetry of a branched arrangement is entirely lost. The symmetrically-branched air passages thus formed by respiration are no longer tubes. I have, therefore, distinguished them by the term "lobular passages;" and a section of these passages shows the *oval foramina*, leading from cell to cell, so conspicuous in a thin layer of inflated and dried lung.*

* *Phil. Trans.*, part ii., 1842; "On the Ultimate Distribution of the Air Passages, and the Formation of the Air-Cells of the Lungs."

The air cells of the lungs, then, are formed at birth by the pressure of the atmosphere acting upon the extremities and against the sides of the *intralobular* bronchial sub-divisions. They have not a general and indiscriminate intercommunication, for there are no anastomoses between the *intralobular* sub-divisions of the bronchi; therefore the cells forming one lobular passage have no communication with those of the adjoining ones, except by their common opening into a larger ramification. (Plate 5, fig. 39, *b* and *c*.)

Anatomical writers use the terms air vesicles and air cells without discrimination, so that they are convertible terms; but it is evident that an air vesicle is an air bubble, and has nothing to do with the structure of a pulmonary air cell. It is not necessary to the existence of an air bubble that it should be contained in a membraneous cell; thousands of them may not only exist, but in any slightly viscous liquid may even press against each other and lose their globular figure without destruction to their individual isolation. The air vesicles of the lungs are just such bubbles; they are of all dimensions; some large, some small, and others so minute as not to measure more than $\frac{1}{800}$ or $\frac{1}{1200}$ in. in diameter; and as the pulmonary cells are fequently much larger, three or four air vesicles or air bubbles may be located in a single cell. (Plate 5, fig. 39, *c*.) The adhesion between these air-bubbles and the tissue of the lung is so strong, that it is impossible to expel them by pressure; and to any one who has witnessed the extreme difficulty of removing them even from the thinnest section, it must appear very

improbable that they can pass to and fro in the *lobular passages* by any respiratory effort.

The membrane of the *air cells* is exceedingly tough, thin, and elastic; it is a continuation of the membrane lining the interior of the bronchial tubes, and numerous granulated vesicles or cells are distributed upon it, which appear to constitute the normal form of epithelium.

20. The dimensions of the air cells, as might have been expected from their structure and mode of formation, vary greatly in the same lung; they are generally larger in men than in women at the same periods of life, and they increase in magnitude with age. The size of the air cells and lobular passages appears to be very much under the control of the individual; exercise of the lungs, or habitual expansions of the chest, by slow and full inspirations, in the early periods of life, certainly have a considerable influence on their volume; the area of the membrane of the cells is increased, and the blood thereby more freely exposed to the influence of the air, giving greater freedom to the circulation. Even the deep inspirations which attend an habitual cough have appeared to me, from an examination of cases of chronic bronchitis, to have considerable influence in increasing the dimensions of the air cells; for I have found them increased in diameter, the minute structure of the lungs being at the same time perfectly healthy. The following cases will be sufficient to show the variable size of the air cells, and to indicate the circumstances which tend to promote an increase of their dimensions :—

Case 1.—A woman, aged 82, long affected with chronic cough, died after two days' illness. The minute or vesicular structure of the lungs was quite healthy, the membrane of the cells being transparent, tough, and elastic; but the lobular passages and the air cells were remarkably large, without having lost in any degree their normal form and characteristics.

Case 2.—A young woman, of sedentary habits, teacher in a school, and not accustomed to much exercise, aged 23, became low spirited, and destroyed herself by dividing both carotids. The minute structure of the lungs was perfectly healthy; the membrane of the cells was transparent, tough, and elastic; but the lobular passages and the air cells were not more than one-third the size of the former case.

Case 3.—Intermediate between these two examples, a healthy man died a few hours after an accident. The minute structure of the lung was quite healthy; the membrane of the air cells was transparent, tough, and elastic; the lobular passages and cells were less than in the first case, but larger than in the second. Taking the air cells in this individual as indicating their average dimensions, I found them varying from $\frac{1}{200}$ to $\frac{1}{500}$ of an inch in diameter, and the *oval foramina* from $\frac{1}{60}$ to $\frac{1}{80}$ of an inch; some of these *foramina* were not more than $\frac{1}{100}$in. or $\frac{1}{150}$in., and there were others still less.

In these examples very thin sections of the recent lung were macerated in water for two or three days, changing the fluid frequently, by which means the

whole of the air bubbles and the blood were removed or dissolved, rendering the minute structure exceedingly distinct; and by very gently extending it on a dark surface, the variable dimensions of the cells were readily distinguished by a lens.*

21. The blood vessels lie exterior to, or between the lobular passages; and as the membrane forming one of these passages is pressed by the inspired air into close contact with that of the adjoining ones, it follows, that the capillary blood channels ramify or run between two membraneous layers, and any increase of the diameter of these channels must separate these layers, so that two contiguous channels soon run into each other. The double character of the membrane of the air cells and the separation of the two layers by the enlarged blood channels, may be demonstrated in the lung of a toad, by an examination of the capillary network by the microscope, previous to and after inflammation: in the former case, only one, or at most two, rows of blood corpuscles are seen passing at the

* M. Bourgery has lately investigated the structure of the lungs, and the results have been communicated to the *Academie des Sciences*. He describes the *oval foramina* and the lobular passages, terming the latter *canaux labyrinthiques aëriféres*. The views of Bourgery resemble those of Helvetius and Haller in this: he considers that the air cells have a general intercommunication throughout a lobule; but he differs from them and from all previous observers in his account of the *canaux labyrinthiques*, which he describes as anastomosing in every direction with each other, and as turning back at the boundary of a lobule to re-enter its interior, and terminate in some of the deeper canals. An examination of the ultimate bronchial sub-divisions in a fœtal lung injected with mercury, in the way pointed out in my Memoir, (*Philosophical Transactions, l. c*) will be sufficient to show the probable inaccuracy of Bourgery's theory.—*Journal Universel des Sciences*, No. 447, *Juillet* 21, 1842.

same time along the channels, and the intervening islets of tissue are comparatively large (plate 5, fig. 40); but in the latter case, five or six corpuscles may be seen side by side, or lying partially over one another, passing through the same channels which are now much enlarged, while the islets of tissue in some places are very nearly, and in others entirely obliterated. (Plate 5, fig. 41.) It is evident in this examination, that the increase in the size or area of the channels has taken place from a separation of the two layers composing the membrane of the cells.

It appears from my observations, and from preparations in my possession, that the blood-corpuscles, arrested in their progress through the capillary channels of the lungs, by an abnormal or inflammatory turgescence, undergo various changes, notwithstanding their circulation is stopped; and that red corpuscles may become pus corpuscles while stationary in inflamed vessels. The distinctness with which the inner vesicles of the red corpuscles of a frog may be seen when dry, or when subjected to the action of very dilute acetic acid, has been particularly mentioned (par. 10); in the irritated and inflamed vessels from which fig. 41 was taken, the outer vesicles of the red corpuscles had almost disappeared, but the inner vesicles were particularly large and distinct; so that it was quite impossible to distinguish the greater number of them from the "lymph globules." This result is in some degree elucidated by the remark of Dr. Barry, who states that red corpuscles, in parts, undergoing a rapid growth and development, (as

in the tail of the larva of the newt, where they are exposed to the influence of the air,) may be traced into epithelium.*

VII. ON TUBERCLES.

(22.) Tubercles of the lungs are generally described as devoid of organization; but this description of them must be understood in a qualified sense; for, in the first place, a tubercle involves or includes in its substance the vesicular structure of the lungs: minute blood vessels, lobular passages, and air cells, are all capable of demonstration on the dissection of a tubercle under a Coddington lens; the blood vessels are no longer permeable, but their presence may be demonstrated. Secondly, I shall endeavour to show that tubercles are composed of *abnormal epithelial cells*.

If a tubercle, or even the tissue of the lung near it, be slightly compressed between two slips of glass with a drop of water, it will crumble down and break to pieces, the fluid at the same time being rendered quite white or milky. This white appearance is attributable to a great number of minute objects, the assemblage of which constitutes the substance of the tubercle. They consist, for the most part, of molecules, granules, and granulated corpuscles, of various sizes, of aggregated granules without any tunic, and of collapsed tunics without any granules. These objects are mingled with a great many shapeless flakes and filaments, which are no doubt fragments of the membrane of the

* *Philosophical Transactions*, *l. c.*, par. 113.

air cells, and of the minute blood vessels which, when involved in a tubercle, become so extremely brittle that they must necessarily form a considerable proportion of the objects occupying the field of the microscope. The granulated corpuscles of a tubercle are sometimes very large ($\frac{1}{800}$in. or $\frac{1}{1000}$in.); and the molecules and granules, which are very conspicuous, may frequently be seen on the point of escaping from them.

The increased amount of the colourless blood corpuscles in all vessels engaged in active nutrition or inflammation, the growth of molecules and granules in their interior, the rupture or dissolution of the tunics of the corpuscles, and the discharge of their contents, have been frequently adverted to in the preceding parts of this memoir. These facts, when considered in connexion with the origin of pus corpuscles and epithelial cells, can leave no doubt that the objects composing tubercles of the lungs originate from blood corpuscles, and not from any peculiar formation foreign to the normal structure of the tissue.

The semi-transparent forms of tubercle and tubercular infiltrations owe their peculiarity to a great relative amount of granulated vesicles, whereas the opaque white forms of tubercle are attributable to great numbers of isolated granules.

Tubercles of the lungs are exceedingly common. They are at first visible as minute white rounded bodies, dispersed at more or less distant intervals in the vesicular tissue of these organs; and very frequently they entirely elude observation, not being discernible unless specially searched for with a lens

in thin macerated sections of the lung, slightly extended on a dark surface, in the manner already described.

The following cases are illustrations in point, and I might have added others of a similar kind:—

Case 1.—A girl, six years old, making no complaint whatever of the chest, was taken with vomiting and fever, succeeded by pain in the head, drowsiness, dilated pupils, and insensibility; in which state she died. On examining the lungs, they appeared to be quite healthy, their tissue was crepitant in all parts, and of the normal light pink hue; no tubercles could be detected by the touch, and all the sections that were made swam in water. After two days' maceration, the sections were slightly extended, and examined by a lens, when a great many minute tubercles were discovered. The tissue of the lung immediately surrounding the tubercles appeared to be healthy, even when examined by a Coddington lens; but when it was submitted to the higher power of the compound microscope, the membrane of the cells was found much less transparent than in its normal condition; it was thickly encrusted or frosted over with molecules, granules, and corpuscles, and the area of the cells appeared to be encroached upon by these objects.

Case 2.—A boy, aged 15, died of fever, ulceration of the ileum, and erysipelas, in the Fever Hospital; no mention of any pectoral symptoms. The lungs were in some places of a dark bluish black, in others of a bright scarlet. Several thin sections were made, in which tubercles could neither

be seen nor be detected by the touch; the sections swam in water and were very crepitant. After two days' maceration all the air bubbles and blood contained in them were removed, and then minute tubercles were found distributed in the tissue; several of the tubercles were surrounded by small patches of grey infiltration, characteristic of commencing hepatization from a slight degree of pneumonia.

Case 3.—A gentleman, aged 60, had enjoyed good health till within six years of his death, when he complained of headache, his mind became deranged, and he died from disease in the brain. He had a slight cough for a few weeks towards the termination of his illness, but it had never excited the attention of himself or his medical attendant. On inspection after death, both lungs were found thickly studded with tubercles, some of which were as large as a hazel nut; and in several places small vomicæ were formed.

These cases show that the formation and growth of tubercles may take place in a very gradual manner, unobserved either by the patient or his friends.

Case 4. (*Tubercular Phthisis.*)—A young woman, whose age could not be ascertained, died in one of the metropolitan hospitals, and the lungs were sent to me, unaccompanied with any of the particulars of the case.

These lungs afforded some very beautiful preparations of uncomplicated tubercular disease. There were no marks of adhesion on the pleura; the structure was not dark red, nor even of a blood colour,

but of a pale pinkish white, and full of tubercles of various sizes, which occupied at least two-thirds of the area of every section that was made. These sections, after having been macerated in water for two or three days, became perfectly white; the minute structure was very distinct between the tubercles, and in the middle of each tubercle there were two or three openings or dark depressions, showing the situation of the *oval foramina* and the *lobular passages*. On submitting the white matter of one of the tubercles to high microscopic power, the following forms were recognised:— Round and irregular-shaped corpuscles; much larger corpuscles filled with granules, from fifteen to twenty of which were counted in some of them; corpuscles, in which the central portion had assumed various irregular shapes; corpuscular tunics, from which the granules had either entirely escaped or were lying partially without the ruptured tunics; and a great multitude of molecules and granules, some of which adhered together in little rounded masses without any tunic.* These objects were mingled with irregular-shaped shreds and filaments, and with ciliated epithelial cells in all stages of growth, which, under the influence of liquor potassæ, were found to swell and elongate themselves suddenly with a jerk, and frequently to exhibit many singular movements, after which they gradually dissolved away and disappeared.†

* See Gerber's *General Anatomy* and Mr· Gulliver's *Appendix*.

† On applying the alkali to these objects, they should first be largely diluted and well mixed with water, otherwise the mucus with which they are mingled interferes with its operation.

Case 5. (*Phthisis.*)—A fine young man, aged 20, reported that he had cough and pain in the side two months ago, for which he was bled, blistered, &c., and relieved. Afterwards, from sleeping in a damp room, he renewed his cold; he had a little hecking cough which plagued him at times, and pain in the left side when he coughed; in all other respects he felt well. He had a hearty robust look, a fine muscular frame, and evidently had not lost flesh; he said that he slept well, and that his appetite was very good; he walked three miles to the Dispensary. On examining the chest, the respiratory murmur was found very indistinct on the left side, and there was a marked difference between that and the right; on taking a full inspiration, there was an obscure deep-seated bubbling mucous *râle,* and on coughing the very characteristic *plash;** yet on closely questioning him, he said that he had no expectoration, *only a crumb or two now and then.* He died in four months, with all the attendant symptoms of a deep and rapid decline.

Now there can be no doubt that in this case tubercles, in considerable numbers, existed in the lungs for a long period anterior to the first attack; and the cold damp room, the supposed cause of the second, was merely an accidental concomitant with the inflammatory irritation which the tubercles were beginning to excite, and the rapid softening they were undergoing in consequence.

23. If the matter deposited in the air cells in cases of pneumonia, and termed "hepatization," be

* Latham's *Clinical Lectures.*

examined by the microscope, objects in all respects similar to those which compose a tubercle are seen, mingled with pus corpuscles.

Case 6. (*Pneumonia.*)—A man, aged 32, died in the Worcester Infirmary. The lungs were very much congested and of a bluish black colour; sections were made, all of which sank in water. After having been macerated for a day or two, the tissue was found filled with a dark yellowish infiltration. The infiltrated matter appeared, through a lens, in minute, distinct, rounded masses, projecting into the air cells. The pulmonary tissue was extremely brittle; it broke to pieces by the slightest attempt to extend it, and when seen by the compound microscope had exactly the appearance of the tissue in the immediate vicinity of a tubercle, *i. e.*, it was encrusted with numerous granulated corpuscles and a great multitude of molecules. The only difference discernible between the little rounded masses of corpuscles and granules in the air cells in this case, and the small tubercles of *Case* 4, was in the yellowish brown colour, and the extensively diffused character of the one and the white appearance and isolated disposition of the other.

Case 7. (*Pneumonia.*)—A sailor, aged 26, died in the Fever Hospital. The lungs were altogether red and solid, having all the appearance of liver. On making thin sections for maceration, white purulent matter oozed out from the air cells and minute bronchial tubes in innumerable places. This matter was found by the microscope to consist of altered red corpuscles, pus corpuscles, and ciliated

epithelial cells, mingled with molecules and granules; and large granulated corpuscles, some of which contained three or four granules, others twelve or fifteen; in some of these corpuscles the granules were crowded together at one side of the corpuscle, in others they had partially escaped.

On examining the macerated sections with a lens, minute granulations were visible, filling up the air cells; these granulations or granular masses were found by the microscope to be composed of the usual objects, various shaped pus and granulated corpuscles, molecules and granules.*

So far then as the microscope enables us to determine, it would appear that similar objects constitute both the matter of hepatization and tubercle. In pneumonia the deposit is diffused over a wide space, it is general and extensive, and takes place with rapidity; whereas in phthisis it occurs in patches, at more or less distant intervals, accumulating very slowly.

From the peculiar and highly exalted nature of the morbid action between the blood and the tissue in pneumonia, the red corpuscles, contrary to their normal disposition, form vital combinations with the structure; this abnormal attraction of the tissue for the red corpuscles is one of the characteristics of inflammation, and has given rise to the

* I take this opportunity of cordially acknowledging the great obligations I am under to S. J. Goodfellow, Esq., M.D., the talented resident physician at the Fever Hospital, for the promptitude with which, on all occasions, he has assisted me in my researches with valuable specimens of diseased lung. My acknowledgments are also due to the medical officers and pupils of the Worcester Infirmary, for similar valuable assistance.

remark of Chomel, that an inflammatory reddening of the tissue may be distinguished from mere congestion, by maceration ; in the former cases, the red colour is only partially removed from thin sections by water, in the latter it is so entirely ; and this agrees with my observations.

24. That tubercles in the lungs arise from an error in nutrition is therefore quite true; but this explanation has hitherto afforded no idea of the nature of the objects composing them, nor does it give any physiological or pathological explanation why they are found in detached or isolated spots. An "error of nutrition" appears to me to be no more applicable to tubercle and hepatization, than to cancer or to warts on the skin.

The circumstances which determine the formation of tubercles, must be studied in conjunction with the origin and progress of cutaneous diseases to many of the chronic forms of which tubercles of the lungs have the most marked analogy; an analogy arising not only from the anatomical structure of the tissue, but from a perfect identity in the character of the pathological results of the two classes of disease. (Par. 16.)

For example, if croton oil be rubbed upon the skin, and the thick matter filling the white heads or points to which it gives rise be examined by the microscope, objects in all respects similar to those which compose a tubercle will be seen, viz., various kinds of pus corpuscles, large granulated corpuscles, ruptured corpuscular tunics, with granules adhering to them, and an abundance of isolated molecules and granules.

There appears from my researches to be no distinction whatever between spots of lepra on the skin and tubercles in the lungs, if we except those arising from the different situation and function of the two tissues. The essential character of both diseases consists in an accumulation of abnormal or unhealthy epithelial cells, derived from vessels in a state of abnormal turgescence; and if the isolated spots of squamous diseases are termed "eruptions," the isolated spots of tubercle are equally entitled to rank under the same designation.

Tubercles of the lungs are more formidable in their symptoms, and more fatal in their tendencies, than eruptions on the skin; not from any peculiarity in their nature, but from the physiological uses of the part they occupy. The tissue of the lungs is so delicate and vascular, that it cannot be in any degree injured, or its functions impaired, without injury to the system at large: on the other hand, the structure of the skin is less complicated and delicate, and its function less intimately essential to the continuance of life. Abnormal epithelial cells, originating a tubercle of the lungs, cannot be readily discharged; whereas the abnormal epidermis cells of the skin dry and fall off, or may be easily removed: hence tubercles in the lungs constitute a most formidable, and very frequently fatal, disease; while chronic cutaneous eruptions are troublesome, but comparatively harmless.

We are not yet able to assign any reason why cutaneous eruptions should appear in spots, any more than we can explain the cause of the peculiar isolation of tubercles; nor are we likely to answer

satisfactorily the latter topic of the inquiry, until a sufficient cause has been assigned for the former. The anatomical structure of the lungs will better explain the isolated character of tubercles than will that of the skin the isolated forms of lepra and psoriasis.

In all cases of obstinate squamous eruptions in which I have seen blood taken from the arm, it has exhibited a thick buffy coat; and all the decided characters of what is called an inflammatory state of the blood have been furnished by these cases. I need hardly remark, that in tubercular disease of the lungs the blood presents a similar appearance.

The various forms and complications of tubercular disease of the lungs are neither greater nor more numerous than those of lepra and psoriasis. An increased turgescence, or inflammation of the vessels of the skin, arising from various causes, will frequently quite alter the appearance of a chronic cutaneous disease, changing scurfy spots into purulent sores, and giving rise to irritation and distress. The varied symptoms of tubercular disease during life, and the different appearances presented by the affected organs after death, arising from acute inflammatory complications, are too well known to require particular mention.

Tubercles of the lungs are composed of objects originating from blood corpuscles, which have been arrested in their circulation through the minute vessels of the structure of the air cells. So long as this retardation is confined to the colourless corpuscles, the morbid actions which ensue are strictly

those of an abnormal nutrition, and various forms of imperfect and degenerated epithelium are the results; but if it extend so as to interfere with the free circulation of the red corpuscles, we then have all the phenomena of inflammation. No new elementary particles are formed to constitute a tubercle; and although from the insidious nature of the primary actions, from the delicacy of the structure, and the important character of the function of the lungs, the treatment of tubercular diseases must always be attended with more than common difficulties; still there is every reason to believe, that they are susceptible of prevention and cure, especially if our efforts for the attainment of these ends be enforced previous to the appearance of a cough, which is not a concomitant of the first stages of tubercular depositions in the lungs.

It is not my intention on the present occasion to enter into the details of the treatment of pulmonary consumption. The primary object in all cases is to regulate the amount of the colourless corpuscles in the blood, and to promote the freedom of their circulation through the minute capillary reticulations in the membrane of the air-cells. By accomplishing this, we necessarily controul the nutritive functions of the tissue, and retard or prevent the accumulation of an abnormal epithelium, of which the substance of a tubercle is composed.

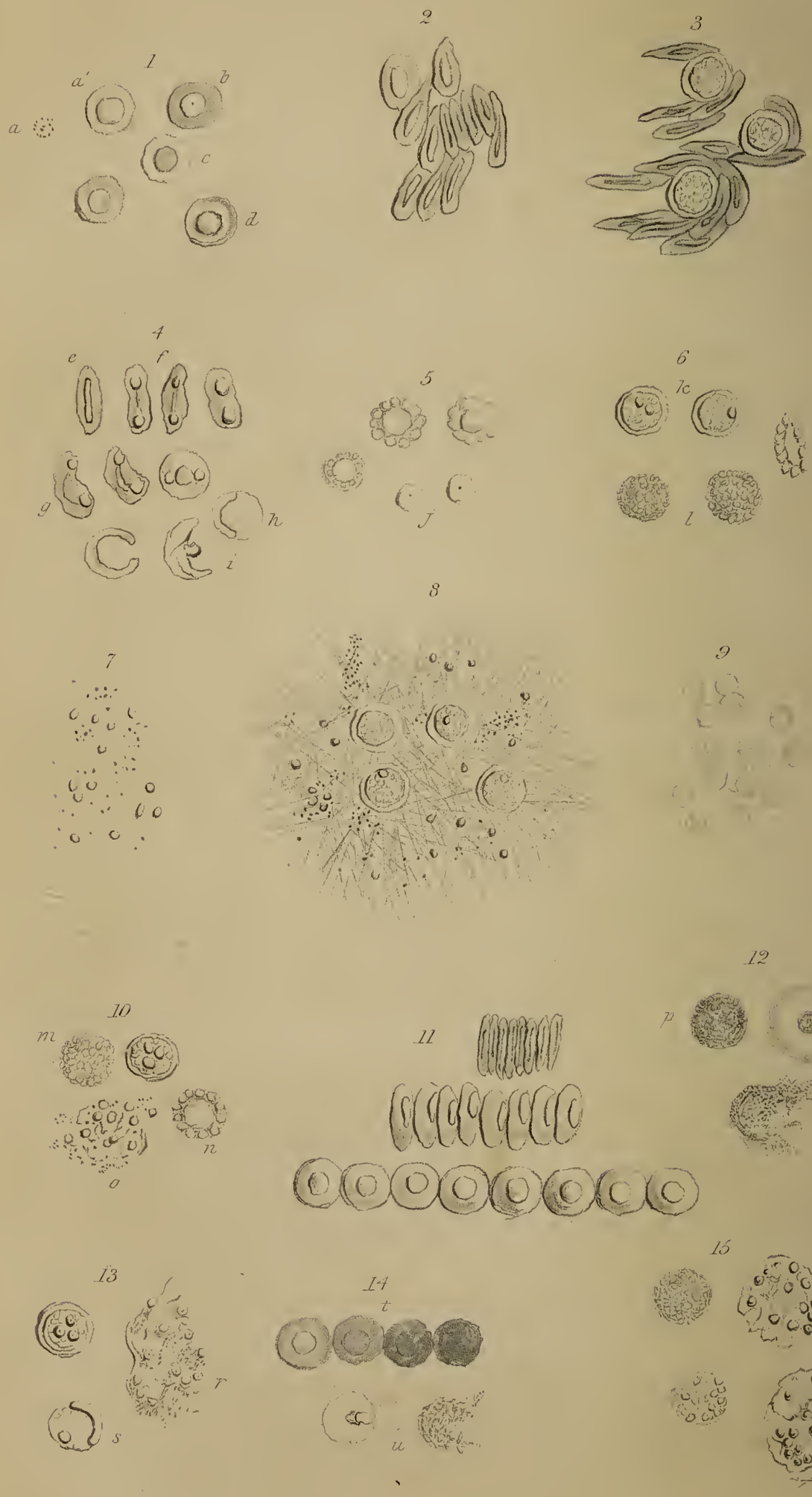
In concluding this enquiry, I must observe, that whatever may be the opinions of physiologists respecting the origin of epithelium and pus, there

can be no doubt that the colourless corpuscles of the blood are the elements which administer to nutrition, and from which the results of inflammation are derived. These corpuscles enter very largely into the composition of all membranes, and they are particularly conspicuous in those which are experiencing a rapid increase of development by active nutrition, as may be shown in the pleura or peritoneum, and in the various layers of the chorion, or of the amnion of a very young fœtus. However thin and perfectly transparent the layers may be, they will, on examination, be found composed of fibres of fibrine and colourless corpuscles, with well-defined molecules and granules in their interior. If similar forms of membraneous tissue, (termed by Mr. Bowman "basement membrane,") be everywhere interposed as a septum between the colourless blood corpuscles on the one hand, and the nascent epithelial cells on the other, they must partake in the rapid and constant changes which are essential to the function of secretion.

There appears to me to be no more difficulty in understanding how the corpuscles, in the progress of these active changes, may coalesce and form the epithelial or secretory surface of such a membrane, and be subsequently evolved from it, as pus globules or epithelial cells, than there is in understanding how they are primarily drawn out of the circulating current and incorporated in such structures for the purpose of nutrition. Still, whether pus globules and epithelial cells arise from a conversion or transformation of the entire corpuscles into these objects, or whether the tunics of the corpuscles are incorpo-

rated with any of these forms of tissue, from which the granules or "germs" in their interior subsequently grow to form them, may be considered as still *sub judice.*

My own opinions upon this point have already been expressed, and I have now only to remark, that the question has reference not to the objects themselves, but to the mode in which they administer to the ulterior functions of secretion and nutrition; and its determination, therefore, either way, does not in the least degree invalidate the fact, that the first step of an increased nutrition, or of inflammation, is an accumulation of the colourless blood corpuscles in the minute vessels of the part; nor does it weaken the argument as to the origin of pus globules or epithelial cells; and what is still more important as regards the present inquiry, it cannot affect the results which relate to the origin and nature of tubercles of the lungs.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EXPLANATION OF THE PLATES.

PLATE I.

FIG. 1.—Molecules and red corpuscles of the blood.

FIG. 2.—Red corpuscles pressing against each other; the central portion loses its figure equally with the outer tunic of the corpuscle.

FIG. 3.—Red and colourless corpuscles: the former very compressible and elastic; the latter firmer and granulated.

FIG. 4.—Various altered forms of red corpuscles, seen after the lapse of a few hours.

FIG 5.—Red corpuscles with granulated border; (*j*) alteration in size and appearance frequently produced in a few moments.

FIG. 6.—Colourless corpuscles; (*k*) outline of the central portion very distinct, molecules and granules in their interior; (*l*) outline of central portion not visible, corpuscles granulated.

FIG. 7.—Molecules and granules in the liquor sanguinis of buffy blood.

FIG. 8.—Liquor sanguinis from the surface of buffy blood, as it appears coagulating under the microscope; showing colourless corpuscles, molecules, granules, and filaments of fibrine.

FIG. 9.—Red corpuscles after the addition of a small quantity of water; showing the central portion of the corpuscles rendered faint and enlarged; the outer portion has been dissolved.

FIG. 10.—Colourless corpuscles after the addition of water; (*m*) granulated at the surface; (*n*) large granules at the circumference; (*o*) corpuscle burst, and granules dispersed.

FIG. 11.—Alterations in the appearance of red corpuscles by imbibition.

FIG. 12.—Red corpuscles after the addition of acetic acid; (*p*) darker and of a minutely molecular aspect; (*q*) *central portion,* dark and distinct; *outer portion,* enlarged and very pale.

FIG. 13.—Colourless corpuscles after the addition of acetic acid, granulated; (*r*) corpuscle ruptured, granules dispersed; (*s*) central portion drawn to the circumference, but not divided into granules.

FIG. 14.—Red corpuscles after the addition of liquor potassæ; (*t*) corpuscles rendered darker; (*u*) central portion protruded.

FIG. 15.—Colourless corpuscles altered in appearance, and much enlarged by liquor potassæ. The corpuscles enlarge suddenly by a kind of explosion, which takes place in their interior without rupturing their outer tunic; this gives way afterwards, and the molecules and granules are dispersed.

PLATE II.

FIG. 16.—Pus or exudation corpuscles; (*v*) irregular and shrivelled; the rest enlarged and ruptured by liquor potassæ.

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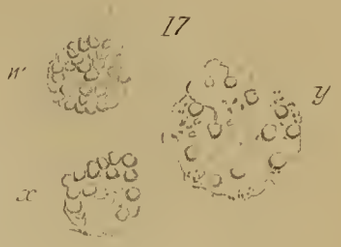

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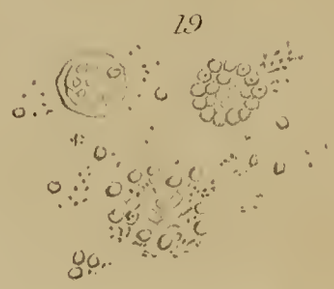

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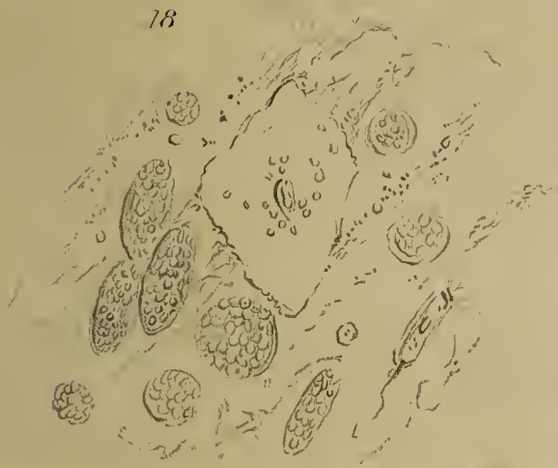

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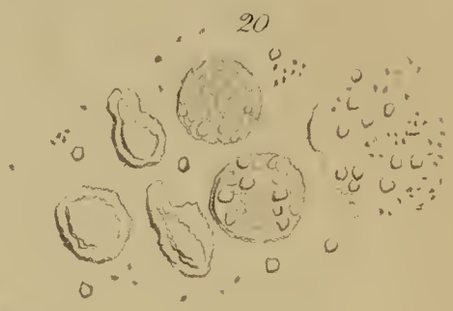

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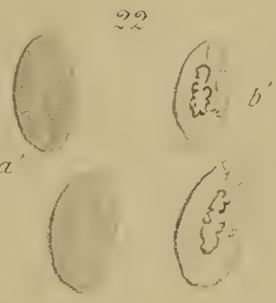

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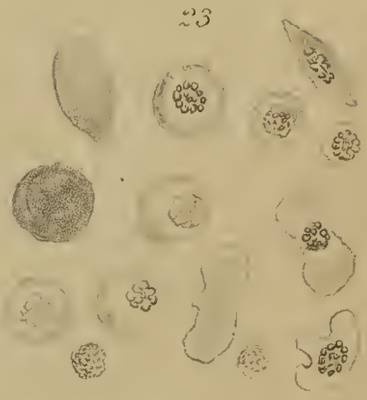

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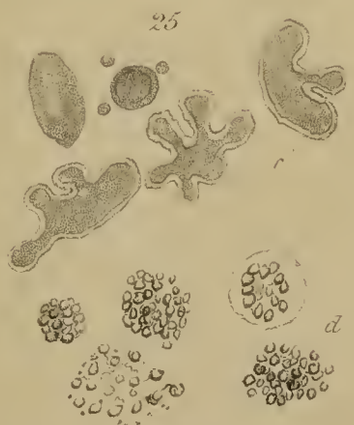

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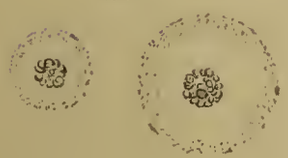

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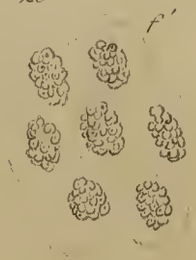

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FIG. 17.—Pus corpuscles; (w) granulated; (x) granules escaping; (y) corpuscle enlarged and ruptured by liquor potassæ; granules dispersed.

FIG. 18.—Molecules and granules; granulated corpuscles and epithelial cells in mucous from the throat.

FIG. 19.—Molecules and granules; pus corpuscles filled with similar objects, from a chronic abscess.

FIG. 20.—Shrivelled corpuscles, from a tear collected at the corner of the eye: the figure shows the effect of water and liquor potassæ.

FIG. 21.—Shows the bursting of one of the preceding corpuscles, with the escape of the molecules and granules.

FIG. 22.—Blood corpuscles of a frog; (a^1) recent; (b^1) dried, showing the inner vesicle or central portion.

FIG. 23.—Blood corpuscles of a frog after the addition of a drop of water; the corpuscles are rendered globular, and the inner vesicle, or the central portion of the corpuscles, likewise appears circular, and resembles the lymph globule.

FIG. 24—Shows the appearance of some of the corpuscles mentioned above, after the addition of a little dilute acetic acid; the inner vesicle exactly resembling the lymph globule.

FIG. 25.—Various appearances presented by the red corpuscles of a frog after the addition of a little liquor potassæ; (d^1) the lymph globule, showing the effect of liquor potassæ.

FIG. 26.—(e^1) Red corpuscles of the frog, dried, showing the inner vesicle; (f^1) the appearance of the inner vesicles after the addition of a drop of water; they are composed of a number of minute granules; (g^1) the appearance presented by these inner vesicles on the subsequent addition of a very minute quantity of liquor potassæ.

PLATE III.

FIG. 27.—Inflamed vessels in the web of a frog's foot; showing the accumulation of the lymph globules, and the peculiarity of their situation; apparently lying among the fibres forming the wall of the vessels, and exterior to their boundary.

FIG. 28.—Cells of the parenchyma of the petal of the *Garden Pansy.* Some of these cells contained a yellow pigment, others a blue or purple; the granules of the cells are attached to the angles of the cell wall. The nucleus is shown in the centre of each cell; diameter of the cells, $\frac{1}{1080}$in.

FIG. 29.—Cells of the parenchyma of the petal of *Borago.* Granules variously distributed in the interior of the cells; diameter of the cells, $\frac{1}{300}$in.

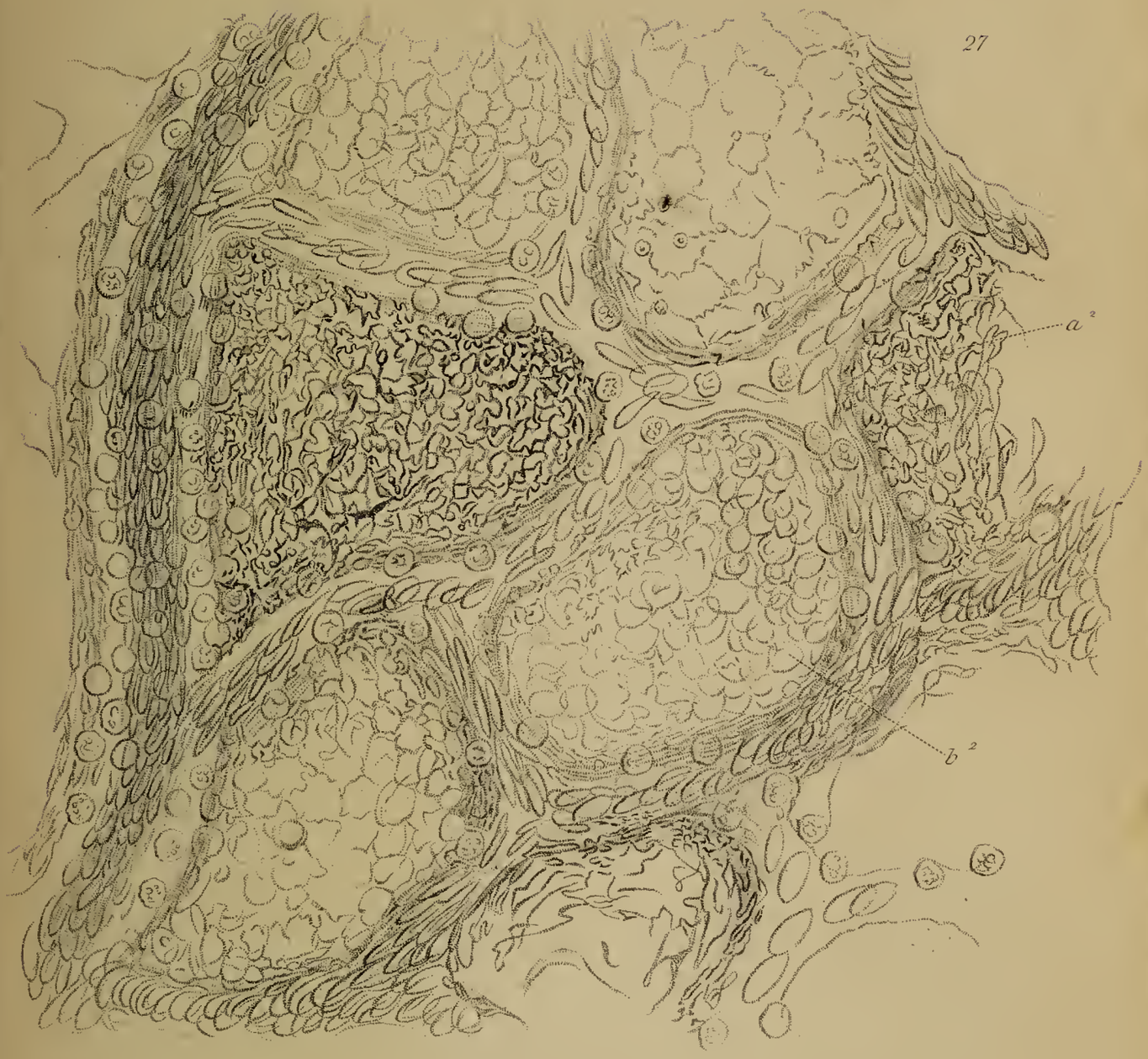
FIG. 30.—Cells of the parenchyma of a petal of *Campanula trachelium.* Granules variously distributed in the interior of the cells. The nucleus, containing a central matter and numerous molecules, is very conspicuous; diameter of the cells, $\frac{1}{450}$in.

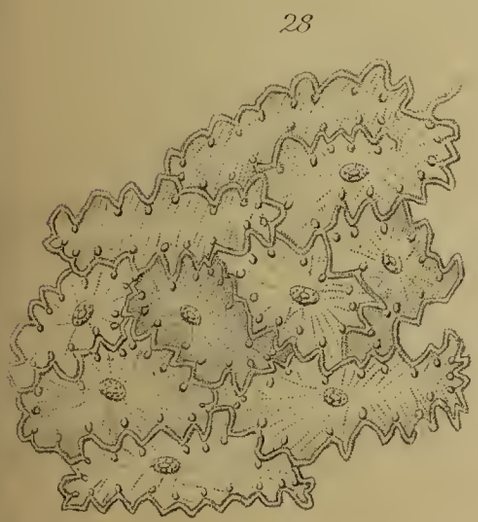
PLATE IV.

FIG. 31.—Cells or vesicles from the leaf of *Sedum acre,* containing a multitude of well-formed and highly-organized granules; the wall of the cells is very thin and transparent; there is no especial nutrimental organ or nucleus visible; diameter of the cells from $\frac{1}{150}$in. to $\frac{1}{500}$in.

FIG. 32.—Granulated cells of *Conferva;* diameter of the larger granules, $\frac{1}{3240}$in.; of the smaller ones, $\frac{1}{10,000}$in.

FIG. 33.—Granulated cells of another *Conferva;* diameter of the granules, $\frac{1}{6480}$in.





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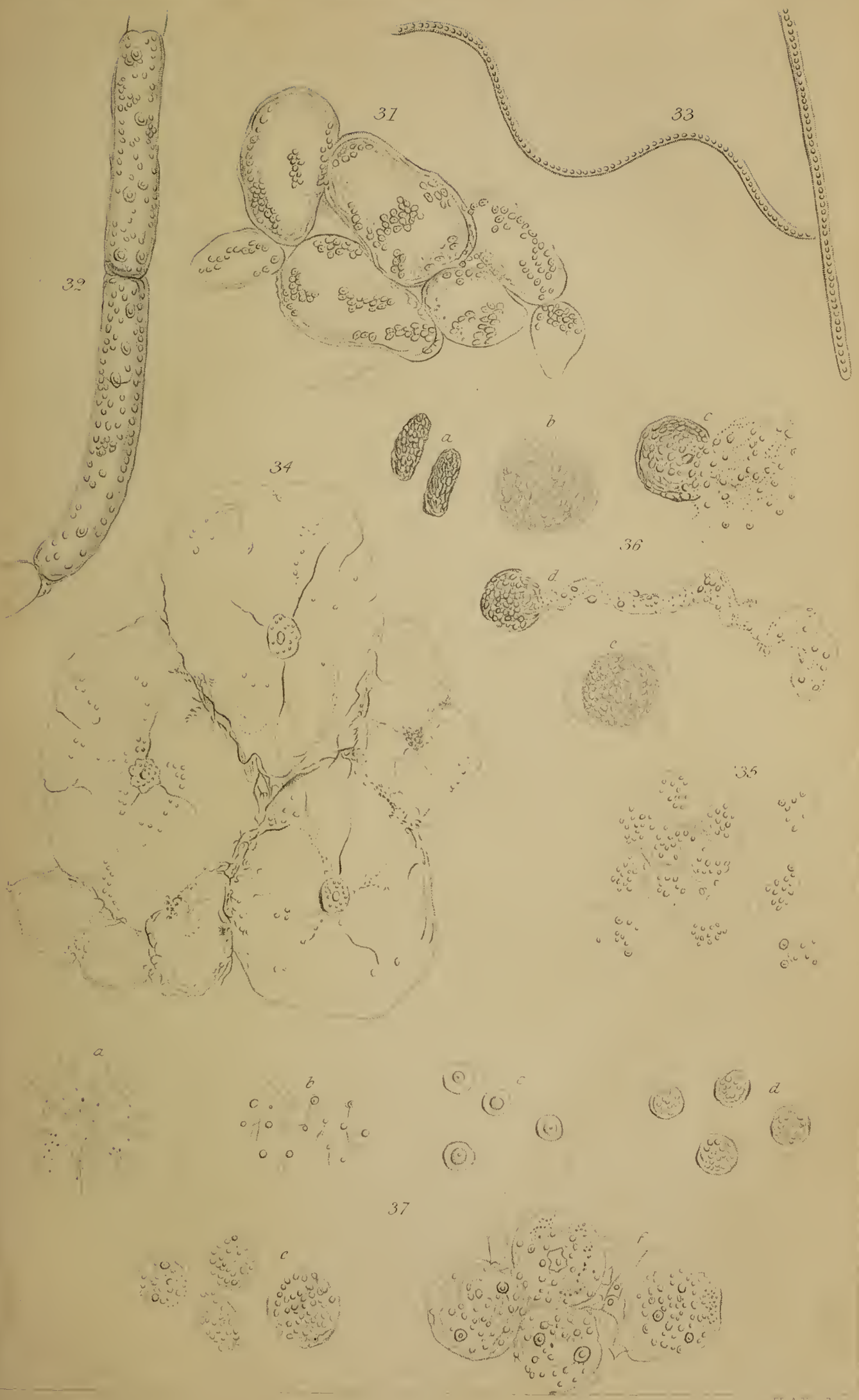

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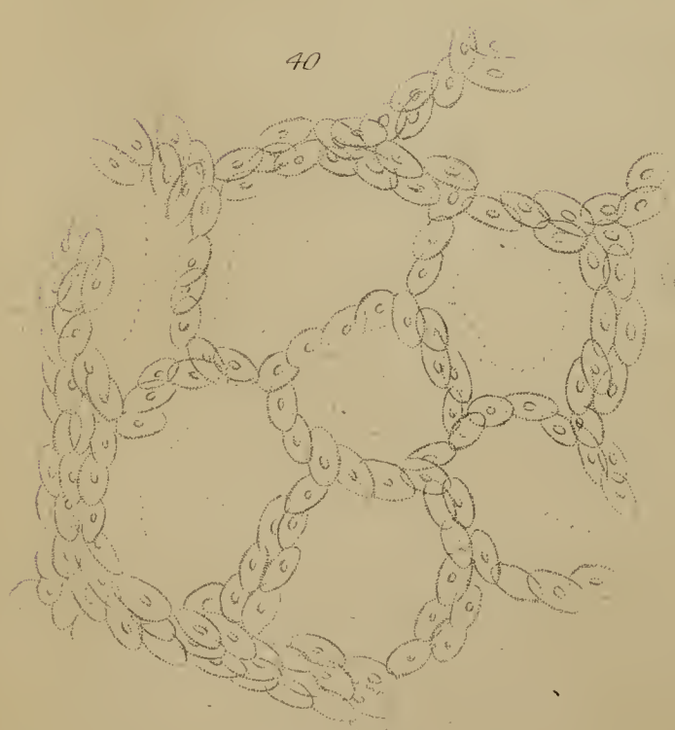

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FIG. 34.—Cells in the fruit of the strawberry (*Fragaria vesca*), cultivated variety, showing the large and very conspicuous nucleus, and the small and indistinct granules; diameter of the cells from $\frac{1}{100}$in. to $\frac{1}{500}$in.

FIG. 35.—Granulated vesicles of the human liver, sometimes seen of a full yellow colour, as if filled with bile; the cell wall is extremely thin and delicate; but the molecules and granules, or the active particles of the cells, are very conspicuous.

FIG. 36.—Pollen-grains of the garden lilac (*Syringa vulgaris*), oblong and granulated (*a*); rendered globular and much enlarged by the addition of water or liquor potassæ (*b*); bursting, and discharging multitudes of molecules and granules from a large rent (*c*); discharging similar objects (molecules and granules) in a tube-like projection (*d*); with light-coloured bullæ at the circumference (*e*.)

FIG. 37.—All the objects in this figure are drawn to a scale. Molecules and fibres of fibrine from the buffy coat of inflammatory blood (*a*); granules and fibres of fibrine from the same (*b*); red corpuscles, diameter, $\frac{1}{3800}$in. (*c*); colourless corpuscles, diameter, $\frac{1}{2600}$in. (*d*); pus corpuscles, showing their transition state between the colourless blood corpuscles and epithelial cells; diameter, from $\frac{1}{2000}$in. to $\frac{1}{1500}$in. (*e*); granulated vesicles from the liver, diameter, $\frac{1}{1000}$in. (*f*.)

PLATE V.

FIG. 38.—Colourless blood corpuscles (*a*); granulated corpuscles resembling pus corpuscles (*b*); corpuscles with large granules (*c*); corpuscles with active vibratile cilia (*d*); corpuscles gradually assuming the form of ciliated epithelial cells (*e*); ciliated epithelial cells (*f*.)

FIG. 39.—(*a*) The intralobular bronchial divisions in the fœtal lung; (*b*) the same injected with mercury, showing

the manner in which the air-cells are formed: each branch or sub-division forms a lobular passage, which consists of a series of air-cells, opening into or communicating with one another; (*c*) the extremities of the intralobular bronchial sub-divisions fully inflated and pressing against each other, forming polygonal air-cells filled with air bubbles, and communicating, to a certain extent, with each other by means of the lobular passages.

FIG. 40.—A portion of the membrane of an air-cell from the lung of a toad; the blood corpuscles pass in single files along the vessels or channels of the tissue.

FIG. 41.—A portion of the same membrane in a state of "abnormal turgescence;" the vessels are greatly enlarged, and the islets of tissue much less.

ARTICLE IV.

SOME CASES SHOWING THE ADVANTAGE OF POWERFUL COUNTER IRRITATION, ESPECIALLY THE LONG ISSUE ON THE CALVARIUM.

BY GEORGE WALLIS, M.D.,

Physician to the Infirmary, and Lecturer on Anatomy, Bristol.

It is unnecessary to enter into any discussion upon the theory of counter irritants, as to their influence in modifying the progress of disease, or the principles upon which they are used as remedies. These points are sufficiently well understood; at least it is not my present object to discuss them. The advantages to which I wish more particularly to draw the attention of the profession may be obtained by the longitudinal incision through the scalp in various diseases affecting the head. In the commencement of my professional life, whilst in *statu pupilari* at the Bristol Infirmary, I had the advantage of the instruction and friendship of the present senior surgeon, Mr. Richard Smith, by whose remarks upon injuries of the head I received the first hint upon this subject. I recollect well applying to him for a reason why he made an incision through the scalp in a case of

severe injury of the head, but in which there was no symptom whatever of fracture of the skull or of depression. His reply was, the patient was always benefitted by it; and for two reasons, a local loss of blood, and the wound becoming an advantageous counter irritant, besides affording the opportunity of ascertaining the condition of the skull. It was from this source that I first gained a favourable impression of the utility of this practice, and from which my present views of the value of an incision through the scalp as a remedy were originally derived.

My becoming physician to the Bristol Infirmary in 1828 gave me an opportunity of putting my ideas into practice on a more extensive scale than could be done in private practice. I have used this remedy in a great variety of cases of organic disease of the brain, both chronic and acute; in paralysis, impending effusions, convulsions, erysipelas of the head and membranes of the brain; in fever in the very advanced stages; in one case of hysteria, with very great advantage; and also in a case or two of mania. The general result of my experience of its use has been such as to confirm my favourable opinion of it, as being the most powerful and efficacious of all our remedies of the class of counter irritants. Its effects are more permanent and its disadvantages are fewer than those of any other remedy now in use. The friends of the patient will occasionally object to it, from that misapplied feeling of affection which converts every energetic effort to save life, if the use of the scalpel be required, into an act of cruelty. This is an objection urged against many of our best, nay even our ordinary remedies,

such as a blister or issue of the common kind. The resistance of the friends, however, is generally overcome by remarking quietly, that "It is only intended to make an issue;" an insignificant trifle compared with the distressing effects of disease.

It has not been my custom to have recourse to this remedy in the first onset of disease, but to keep it in reserve until all the ordinary means have been fairly tried, and have failed to produce that amount of relief which would give a just and reasonable expectation of recovery. In keeping any remedy in reserve, however, the golden opportunity must not be allowed to slip away, especially in an acute disease, which often makes a quiet and stealthy progress, to an extent not to be overtaken or checked by any means which human ingenuity can devise. This is often the case with serous effusions into the ventricles of the brain of young subjects. It is scarcely necessary to say, that when the ventricles are once full, and pressure has commenced, although not to the extent of dilating even one pupil to any considerable size, it rarely happens that absorption can be promoted sufficiently to lead you to entertain a favourable opinion of the issue of the case. Some judgment and careful observation are required in cases of this kind, not to allow the opportunity to be lost either from irresolution on your own part or from want of watchful attention to the progress of the disease, which often makes rapid strides towards a fatal termination.

In chronic diseases you have more time for deliberation and for the trial of less formidable expedients, the inefficacy or failure of which will

induce the patient or his friends to desire more energetic means to be produced, affording the opportunity of proposing this remedy as one from which much good may be expected, and as having a power far beyond that of our ordinary remedies.

The circumstances which are necessary to be attended to in making the longitudinal incision or issue on the calvarium are these:—Let the head be shaved entirely, and have the patient brought near to the right side of the bed; raise the head by a hard pillow, and put a towel round his neck to receive the blood; let an assistant keep the head steady; at the same time draw the scalp downwards in all directions, so as to strain the calvarium as much as possible; the scalp will divide with so much more ease. In this, your own left hand will materially assist, by placing it at the upper and back part of the head, commencing the incision between your thumb and fore-finger as far back as the lambdoidal suture; press the scalpel sufficiently down so as *to divide the scalp entirely through at once;* carry on the incision directly along the sagittal suture as far as the hair grows on the scalp, and which will cover the cicatrix after the issue is healed up. The length of the incision thus made will be in the adult about seven or eight inches; take care that the scalp be divided entirely and perfectly through, so that the edges of the incision will separate so far as to enable you to introduce a dossil of lint, rolled up hard, as thick as two fingers, and which should be well soaked in spirit of turpentine; this answers the double purpose of increasing the effect of the incision, and makes suppuration come on earlier,

and will usually assist in stopping a further loss of blood. The arteries very soon retract and cease to bleed; there is seldom more than six or eight ounces of blood lost, and this quantity may be very readily curtailed if it be desirable to do so.

In those cases where depletion has been carried to a sufficient extent, prior to your determination to use this remedy, and the further loss of blood be unadvisable, it may be prevented in the following manner:—The instant the incision is completed, close the sides of the wound and make pressure upon it with your hand, whilst your assistant hands the lint, well soaked in the spirit of turpentine, and rolled up firmly of a proper length, so as not to extend beyond the extreme length of the incision, as it would be inconvenient in strapping down the wound sufficiently to check the flow of blood; a little flour and dry lint may be superadded if necessary, but the dossil must not be made so thick as to rise much above the edges of the wound, or else the adhesive straps will not be secure by being elevated, and thereby prevented from adhering near the edges of the incision. Should the incision be imperfectly made, that is to say, not entirely through the scalp, the arteries might be only partially divided; in which case they will continue to bleed, notwithstanding the pressure you may have made; of course the arteries will require to be completely divided, to allow them to retract and cease to bleed.

The best method to adopt where there is much restlessness and delirium, and to which I generally have recourse when a further loss of blood is not

desirable, and there is a risk lest the patient should disturb the dressing and cause the bleeding to be renewed, is the application of the *actual cautery* for an instant to the arteries; this is very readily done, and is not perceived by the patient. It is better to be provided with the means of doing so in every case where any additional loss of blood cannot be afforded. The common thick plaister knife, which is used for spreading plaisters requiring heat, answers very well, and should be put into the fire to be ready if wanted; in one instance I had occasion to regret that the surgeon did not take this precaution. The arteries divided are, of course, the coronal branch of the temporal and the anterior superior branch of the occipital, making two on each side; they will cease immediately to bleed by a slight touch of the red hot iron for an instant. This is a safe mode of proceeding, especially in all those cases where the loss of blood cannot be borne, and where the surgeon lives at a distance from the patient. In the greater number of cases, however, the loss of a few ounces of blood is an important advantage, and the arteries will retract and cease to bleed before you desire them. In such cases, where it may be desirable that a certain quantity of blood should be lost, the hæmorrhage may be promoted by the constant sponging of the wound with warm water.

When sufficient blood has flowed, introduce the dossil of lint, press it well into the wound so as to separate the edges as widely as you can, and apply your adhesive straps. These should not be more than one inch wide, and must be eight or ten inches long, that they may have a firm hold of the scalp,

and support them by the double-headed bandage; or perhaps, in those cases where the night delirium is troublesome, the patient may pull them off or loosen them with his hands, or whilst rubbing his head or rolling it about on the pillow, by which means the arteries may be again opened and a serious and inconvenient loss of blood may occur; one instance of this kind having occurred in my practice, I do not wish to see another. The straps ought to be cut or set at liberty on the next day, the first minute you are safe from renewed hæmorrhage, on account of the inconvenience the patient feels from the pressure. Great relief is felt when the straps are cut, and a bread and water poultice is placed along the head on the top of the lint.

If suppuration be not inclined to come on by the second or third day, a little spirit of turpentine may be rubbed up with some unguentum resinæ flavæ, or even a little blister ointment, either diluted or not, may be used. When the lint comes out, another dossil may be used, rolled up in the same way, covered with digestive ointment or savine ointment, &c., so as to keep up an effectual irritation. In a few days a double row of peas, seventy or eighty strung together, may be used to prevent granulations filling up the issue; a point rather difficult to accomplish, especially in chronic diseases where the issue is required to be kept open three or four months. Indeed this cannot be done without the repeated use of caustic, the application of which, however, is beneficial, not only in keeping open the issue, but also in adding to the effects of the issue as a counter irritant. Most cases require this

to be done every five or six days, if you wish to keep up a continued and energetic effect. In cases of chronic disease, such as the following, such a mode of treatment is absolutely essential. I shall adduce only two or three cases of each kind, as examples of each disease in which I have been accustomed to have recourse to this remedy :—

William Griffiths, aged 19, in ward No. 5, had been subject to fits for many months prior to his admission into the infirmary, and had so complete a state of amaurosis six months before his admission as not to be able to perceive light, or in what direction the windows were. He stated that he had been entirely blind five or six months: he suffered severe pains in his head; was in a state of great debility, although no paralysis; pulse frequent, though not very strong; skin generally cool. Cupping and leeching were used as far as these remedies could be carried, accompanied by repeated and extensive blistering, without any very ostensible benefit; continuing this plan upwards of a month. I cannot give the dates accurately, as the book containing this case is unfortunately lost; but the subject can be referred to if necessary, as he is now in the house for fever. He has been at sea since he left, his vision being quite perfect. On entering the ward after this, I found him stretched out, perfectly rigid and insensible, and was informed by the nurse that he had been in that state upwards of three hours; I ordered the incision to be made immediately, and the spasm ceased in a very short time afterwards. The issue was very efficiently kept open by repeated applications of caustic, and

renewing it with the scalpel for upwards of four months, during which time he had very few fits, and these but slight, and which altogether ceased long before he left the house. His health improved, the pains in his head decreased, and he left the house in perfectly good health. After the incision was made I used no remedies, except such as were requisite to keep the digestive organs healthy, trusting wholly to the influence of the counter irritation. Some little time before he left the house he could discover the position of the windows; after leaving the house he gradually recovered his vision, having been totally blind for nearly twelve months; his intellect is not injured; he can now work and maintain himself, having been to sea since.

Meningitis Chronica.—Harriet Wilkins, aged 36, after suffering for a long time with this disease, without relief from any of the remedies which had been used, the incision was made, and she left the house convalescent in thirty-eight days.

John Dwyer (ward No. 8), now in the house, has suffered severe pains in his head for some months; has lost the vision in his right eye; has much giddiness: the pain is principally in the left side of his head; the scalp thick and tender to the touch; the conjunctiva of both eyes became suffused whilst in the house. His head was shaved, and he was leeched and cupped, as far as appeared possible, and blistered repeatedly, and certainly with no apparent diminution of disease. The attention of the students was particularly directed to this point, feeling confident that relief from such a formidable and long-standing disease could not be

obtained by less energetic remedies than the incision. Sufficient time having been given to these trials, the incision was made, and the issue has been in operation about a month. The pains in his head have ceased, his health is greatly improved, and he considers himself as getting well. The right eye is as yet not much improved, but he says it is improving; and if the issue be well kept up for three or four months I expect it may be recovered. It is quite clear the man is fast recovering his health, not having complained of pain or giddiness for some time.

Another case of this character came to me from Monmouthshire :—Mr. Prosser had suffered from severe pains in his head for some weeks; his vision almost extinguished; his walking very feeble and unsteady; his intellectual powers much diminished: his case had been considered as hopeless. The incision was made, and after being in operation about a month, all these symptoms abated; he reports that his head is now quite well. I learn, since the above was written, that he has had a disordered state of the mucous membrane, accompanied by some fever, which had ended fatally, apparently owing to a resolute determination to eat and drink anything that he chose, however improper. I am also informed, that the symptoms of disease in the head did not reappear.

Apoplexy and Paralysis.—Mr. Doughty, innkeeper, aged 40, was seized with apoplexy and paralysis of one side; had been bled sufficiently before I visited him, two or three days after the seizure. Mr. W., who had been called in the first instance, considered,

from the increased torpor and diminished sensibility, and other symptoms, that further mischief was impending: he, therefore, desired a consultation. I recommended the incision to be made immediately; the relief was very conspicuous, and he recovered perfectly without any limitation in the action of the paralyzed side, and remains quite well.

Mr. Brookman, of Old Park, aged 25, whilst under great excitement and exertion, was seized with apoplexy and paralysis, evidently from a ruptured vessel; was apparently quite insensible. After sufficient depletion, he did not appear to have any returning sense for some days. The incision was made, which appeared to produce immediate improvement, and he gradually recovered. Five or six years have elapsed, and he is now in good health; the power on one side is, however, limited.

Mr. Clark had suffered severe pains in his head for three or four weeks, for which he was bled, cupped, leeched, and liberally blistered; notwithstanding which he began to complain, after three or four weeks' continuance of remedies, of weakness and loss of power in the left arm and leg. Depletion and blistering were renewed, as far as appeared possible, without arresting the progress of the disease; on the contrary, an accession of mischief occurred, and he suddenly and totally lost the voluntary power of the right side, and was now lying totally devoid of any power whatever to move, and entire loss of speech; his vision appeared to be perfect, although not so good on the right eye as the left, the pupil of which (*i. e.*, the right) was more dilated than the left; he swallowed with some

difficulty; pulse upwards of 120, and feeble; countenance pale. The incision was made eight or nine inches long, and very little blood allowed to escape, not more than five or six ounces; lint, well soaked in spirit of turpentine, was introduced; no remedies were used, except keeping the bowels open, and taking a little carbonate of soda to relieve flatulence; he gradually recovered his speech and his power to walk. It is now about four years since the issue has been closed, having been kept open five or six months; I have recommended him to be cupped occasionally, which has been done three or four times. He walks with a halt or jerk on his right side, and speaks with a husky voice and considerable effort, but considers himself in good health; I have not visited him professionally since the conclusion of that attendance, four years ago; his wife has borne him a daughter within the last three months, being the first, although married about seven years.

Charlotte Price, aged 48, admitted into No. 4 ward with paralysis of the left side; she had been sufficiently bled before her admission. The incision was made, and no other remedies used, except keeping the bowels open, and she quite recovered her power in about two months or a little more.

—— —— was admitted into ward No. 7 of the Infirmary; had been seized with paralysis on both sides; had been bled before he was admitted. He had no power to move hand or foot; evacuations passed unconsciously; he could swallow fluids only. The pupils were contracted uniformly to a very small point; the power to articulate any sound

was entirely lost: skin cool, pulse small and frequent. He was of rather spare habit, sallow complexion; he appeared to be conscious of surrounding objects, as he directed his eyes towards persons approaching his bed. An incision was made about eight inches long, not much blood allowed to flow, as he had been reduced sufficiently before he was admitted into the house. On my visiting him the day but one afterwards, he had recovered the power of speech, and addressed me in the following words: "You do not know, Sir, how much I am obliged to you for having had my head cut." In little more than two months this man went out of the house perfectly recovered. No other remedies were used, except such as were necessary to keep the digestive organs in a healthy state.

Mrs. B., of Clifton, had been subject to chronic disease in the head for some years, which required her to be occasionally cupped, or have leeches applied; was seized with paralysis; bleeding was had recourse to liberally and with some relief; an epileptic fit occurred some hours afterwards, the duration and violence of which seemed likely to prove fatal; after the fit had ceased the prostration was very great, and the loss of power of one side complete. Feeling confident that another such a fit would most probably terminate life, I ordered the incision to be made immediately, and to be treated in the usual way; there was no more epilepsy, and her power gradually returned. The issue was not kept open either so long or so efficiently as appeared to me be desirable; it was irksome and disagreeable, and therefore was allowed to

close. Two years and a half afterwards she had another paralytic seizure, not so formidable in appearance, and unaccompanied by epilepsy ; I was called to attend her, and was informed that she had left directions that if she should have another attack of paralysis the incision must not be allowed to be made ; the ordinary means were used, such as cupping, leeching, blistering, &c., but she never recovered the use of her limbs, her speech continued muffled and imperfect, and in about two months afterwards she died.

Richard Hobbs, aged 19, admitted into No. 6, had complete paralysis of the right side ; the pupil of the right eye was largely dilated, and did not contract by light ; he swallowed with great difficulty, and that only thin fluid ; pulse frequent and small. The powers of life were very nearly extinguished, and evidently only continued from the youth and vigour of the subject. After being in the house a few days, the incision was made, the power of deglutition immediately improved, and he was evidently much benefitted ; after improving considerably he became dull and heavy in his head, which was relieved by cupping ; his intellect was very much injured, and it was difficult to make him take a little opening medicine. By the assistance of occasionally cupping and keeping seventy or eighty peas in the issue, he so far improved as to be able to leave the house, although with but little power in the right side, the right eye still remaning dilated and without visual power. Notwithstanding the powers of the right side of the body were not recovered, although improved, I

consider this case valuable, as it appeared to me that life was preserved under unusually severe circumstances. The improvement which took place in the power of deglutition was evidently the point on which life depended, and which began to improve immediately after the incision.

Mr. T. Stephens, aged about 40, had been accustomed to drink very much: was seized with paralysis, and by the use of the ordinary remedies had recovered, in a great measure, the lost power of his right side. But a very severe iritis came on: his head was shaved, and liberal local depletion, blistering, mercurial action produced, bella donna used, &c., without alleviating the excruciating agony of his sufferings; his vision was almost entirely lost. Despairing of relief, everything having failed, the incision was made, which relieved him entirely in a very short time, and recovered both his eyes; his health was perfectly restored, and remains so to this day, although he has drunk occasionally since. A year or two afterwards, he had some renewed inflammation in his eyes, and cataract has formed in one; he has had no return of paralysis, and is as strong and active as before the attack.

In one or two cases in which the incision was made and the patient did not recover, death took place soon after the first seizure, and evidently from its immediate effect. It should, be oberved, however, that after the incision has been made, it does not come into full operation immediately as a drain; and if the determination of the blood to the head be too great, cupping or leeching must be

used for immediate relief. I do not recommend the issue to be made in the first instance: the most suitable time appears to be after depletion has been carried as far as is prudent; I say prudent, because it is too much the practice to draw blood as long as the heart can carry on the circulation, without regard to the embarrassed condition produced in the functions of the brain by the annihilation of a large portion of its active powers.

Epilepsy.—I have seen very good effect in some cases of this disease, which appear to have arisen from chronic disease of the membranes. In such instances, however, where ossification of the *dura mater*, or other permanent change of structure, may have been the cause of irritation, but little good can be expected.

John Parsons, No. 7, now under treatment, has been long subject to fits, occurring frequently from his childhood. He was admitted three months ago: his countenance suffused, having the appearance of blush constantly; pupils dilated considerably; very dull and heavy, intellect obtuse; pulse upwards of 100; generally has fits two or three times a day, lasting ten minutes or a quarter of an hour. Was bled, head shaved, cold applications, and general antiphlogistic treatment; cupping, leeching, and blistering, have been performed repeatedly; and continued this treatment fifteen or sixteen days without arresting the frequency of the fits, his general condition appearing materially to deteriorate. He was rapidly losing what little intellectual power he possessed, and his bodily energy sinking; he was scarcely able to get out of bed to the night

chair. The incision was now made and treated as usual, and rather more diet given. It is now eleven weeks since the operation, and he has had only one slight fit, about six weeks since. He says that he never recollects having been so long without the occurrence of a fit in all his life as since the incision has been made; his health is improved and also his intellectual powers, and he is at this time in a condition fit to be sent out of the house. Nothing could be more marked than the essential benefit he derived from the issue. In many other cases of this kind this remedy has always appeared to do more good than any other, even when it has not completely succeeded in preventing the recurrence of the fits. I could adduce many more cases of this kind.

Hydrocephalus.—From my experience in the effects of the issue in this disease, I feel satisfied that it will contribute most essentially to prevent serous effusions within the head. Here, however, much is required of the discretion and judgment of the practitioner: effusion must not be allowed to proceed until symptoms of pressure are produced. The remedy must not be expected to produce effects which are not probable, and barely to be considered as possible. I shall not enter upon the question of the *absorbents of the brain,* so far as regards their power to remove accumulations in the ventricles. As a remedy to prevent these fatal accumulations, nothing equals, in my opinion, the incision through the scalp, if made before the accumulation of serum in the ventricles has proceeded so far as to produce symptoms of pressure.

Master Jones, aged 12, after scarlatina, became anasarcous, with effusions into the serous cavities; urine resembling coffee, enlargement of the glandular viscera, &c. He had suffered in this condition for some time before I was called to see him. The day before I saw him he was seized with convulsions, which recurred at short intervals; and whilst I stood by his bed he died in a convulsive fit, before I had time to take any measure to relieve him. In about a month afterwards, I admitted into the Infirmary a boy of the same age and under exactly the same circumstances, viz., anasarcous, and with effusions into the serous cavities, and enlargement of the glandular viscera, and the urine like coffee. He was ordered the general antiphlogistic treatment, with hydr. c. creta, gr. v. twice a-day; this was continued for some days without benefit, when he was seized with convulsions early in the morning. Various remedies were used before I visited him, without lessening the recurrence of the convulsive fits, which were almost constant. When I saw him about one o'clock, the usual hour of going round the house, he was apparently sinking; pulse very feeble, and scarcely to be counted; extremities cool, and constant subsultus; countenance collapsed and of a leaden hue. I ordered the issue to be made instantly, five inches long, which produced immediate relief, and he had no return whatever of convulsions; the glandular enlargements and effusions were removed by sponging the body frequently with a lotion of the nitro-muriatic acid, and the boy perfectly recovered.

Another case of this kind occurred in Master R.,

who was anasarcous, with effusions, enlarged viscera, and urine like coffee: whilst playing at draughts with his brother, about six *p. m.*, suddenly and totally lost his vision, and was convulsed: the convulsions occurred frequently during the night. A great variety of remedies were used without benefit, his head was shaved in the morning and ice applied, but the convulsions still continued at intervals, and there was no return of vision; although in possession of his senses during the intervals, he could not distinguish a candle held before his face. This state had continued twenty-four hours when I first saw him; he was greatly exhausted, the pulse had become very feeble and scarcely to be counted. I ordered the incision to be made immediately, which, to save time, was instantly done with a penknife; he was immediately relieved, and had no recurrence whatever of convulsions. He recovered his vision gradually in about forty-eight hours after the issue was made, and by the use of the nitro-muriatic acid lotion the visceral disease subsided, the urine gradually became natural, and the boy perfectly recovered, and is now stronger and in better health than he used to be prior to the attack of scarlatina.

In a younger brother, aged eight, who had scarlatina at the same time, and was anasarcous, with the urine black, the nurse was supplied with a blister, about three inches wide, reaching the whole length of the spine, which she was ordered to apply if convulsions should come on. Convulsive action in the arms and subsultus came on, with a leaden paleness round the mouth: the nurse immediately applied the blister, which seemed to prevent the

occurrence of general convulsions, and by sponging the body with the nitro-muriatic lotion the child perfectly recovered.

I have made the issue in some cases of hydrocephalus, after the effusion into the ventricles had so far proceeded as to affect the pupil of one or both eyes. In both the instances I am about to mention it produced relief and protracted life, although neither case recovered.

Master R., aged five, had the usual inflammation of the gastro-enteritic mucous membrane, which proceeded in the customary way. The sudden screams, throwing the hands to the head, and occasional convulsions, with the pupil of one eye dilated and fixed, sufficiently marked the progress of effusion into the ventricles. An incision, of about four inches long, was made. The convulsions did not recur for some days until just before death, the sudden screams ceased, and the child was evidently very much relieved; so much so, as to flatter the parents into an expectation of the child's recovery. This case occurred in the year 1830.

Master K., aged three years.—I did not attend in the early stage of this disease; it was, however, one of the ordinary character. The child had begun to suffer from the usual effects of pressure the day and night before I saw him, as shown by the sudden screams whilst asleep, &c. Notwithstanding the early age I ordered an incision four inches long. The progress of the effusion was evidently interrupted. The child improved so much as to afford some really reasonable expectation that it might recover; his vision improved. The child

lived ten days afterwards, and died more from exhaustion and irritation, consequent upon the injury the brain had received, than from the direct effects of pressure. I think there is but little reason to doubt that if the incision had been made twenty-four hours earlier, this case would have been saved. The parents of both these children were so fully satisfied of the relief derived from the issue, that it was a matter of regret to them that it was not adopted sufficiently early.

Acute Inflammation of the Membranes of the Brain.—Mr. H., of Bedminster, had suffered severely from acute inflammation of the membranes of the brain; had been bled liberally, and the usual routine of practice in these cases vigorously pursued; notwithstanding which, his situation appeared extremely critical: countenance pale, hands tremulous, pupils contracted, intolerance of light; pulse 140, small and feeble; delirium during the night, &c. The incision was made with immediate relief, and he rapidly recovered without any further trouble.

Mrs. Collier, aged 19, with severe acute inflammation of the membranes of the brain. The usual course of depletion, both general and local, antimonials, mercurials, and the antiphlogistic diet, were fully carried out; the head shaved, and cold applications applied, all of which did not arrest the progress of the disease: the pain remained excruciating; intolerance of light, no sleep, a small, rapid pulse, and every indication of serous effusion impending. The incision was now made with immediate relief, the whole alarming features of the case changed, and she recovered rapidly, without

any further means being used, except a little saline mixture, and keeping the bowels open.

Mrs. P., Picton Street, was another case of the same kind, running to a like severe extent. The usual practice having been actively and judiciously enforced by Mr. C., as far as appeared possible, without the progress of the disease being arrested. Mr. C. having given an unfavourable opinion of the issue of the case, I was called in, and advised the incision to be made immediately, which was done. It was followed by conspicuous relief, and perfect recovery in a very short time.

J. Dark, aged 20, whose father died maniacal, had been subject to severe head-aches frequently for the last two years; bowels constipated generally: was seized with acute shooting pains in his head, intolerance of light, &c. General and local depletions, and blisters, were administered to him with an unsparing hand; the action of mercury was produced, but without any material relief to the pain and intolerance of light. He had become greatly exhausted by the continuance of these symptoms, loss of rest, &c., when despair induced his mother to allow the incision to be made. Relief followed, though not so rapidly as in the cases previously enumerated, no doubt owing to this case being one in which acute symptoms had supervened upon a previous chronic disease in the membranes, as shown by the frequent and severe head-aches which had distressed him prior to the access of the acute disease. There might also have been an hereditary tendency to disease in this case, considering that his father died in a state of mania.

The issue was kept open for about four months, and he is quite recovered.

These are but a small portion of cases of this kind; and, as far as my memory serves me, no one case was unsuccessful where the incision was made before a destructive effusion had occurred. I can confidently recommend it as the most efficient safe-guard, to prevent effusion, now in use. No other remedy that I have ever used has so much power and so little inconvenience or disadvantage.,

Mania.—I have not had much opportunity of testing the effects of this remedy in maniacal diseases. I tried it in one instance only, and that was scarcely to be considered a fair case to ascertain its influence. This was the case of —— Ball, who was admitted into the infirmary in an active maniacal state. After the primary symptoms were subdued, and a calm state, with a partial return of intellect, which gave some promise of amendment, there commenced evident indications of the cerebral matter undergoing those changes which generally terminate in a softened state of the organ—a state corresponding with *delirium tremens;* tremulous hands, and in almost constant motion, without power; no sleep, and those sudden and alarming fits of collapse which often terminate life. In this condition the incision was ordered to be made, though not whilst in a state of collapse, and as little blood was to to be lost as possible, and which did not exceed one ounce. He appeared to be improved in his mental faculties, and to be less tremulous the next day; but he died in the evening in a fit of collapse. The pulse was good, and quite sufficient in power

up to the moment the collapse commenced, when it sunk suddenly. The *post mortem* examination did not show any great progress in softening; the duration of the disease was not sufficient for this effect. The bloody points of vessels were very numerous in slicing the substance of the brain; and the membranes indicated that inflammation had existed in them, though not to that extent which is commonly observed in ordinary fever. I think, if the incision had been made earlier, it might have saved him, as in the following case it proved of great value.

Delirium Tremens.—H. O., Esq., was thrown from his horse and received a severe blow upon his head, which rendered him insensible for a short time. He proceeded home in a chaise, nearly twenty miles; he took no further trouble with himself, but went out to dinner parties and drank considerable quantities of wine, and in about ten days he became unsteady in walking, and gave his friends the idea of his being intoxicated, and not altogether in his right senses. I was required to visit him, and found him unable to stand: hands tremulous and in constant action, no sleep, starting suddenly, and often laughing heartily at phantasms, pointing to different parts of his room, and exclaiming, "Did not you see that fellow capsize his tandem?" &c. I ordered cupping to fourteen ounces, which was done. I should have remarked the pulse was full and frequent. Seeing that he bore this without faintness, although on a former occasion, whilst under inflammatory action, I found that not more than ten or twelve ounces could be drawn, by the lancet, without fainting, even whilst in bed; I ordered cupping to be repeated as far as he could

bear; when thirty ounces were drawn, with some relief for a short time. The pulse, after a day or two, became very frequent and small; and great increase of debility. Opium appeared to increase the restlessness, although given in large doses. Calomel was given in frequent doses, with the view of producing ptyalism. The symptoms, however, indicating a downward progress, I ordered the incision, which quieted him more than anything else that had been done, and he began gradually to improve; and trusting solely to the effects of the incision, a mild diet, and proper state of the bowels, he perfectly recovered. I had the issue kept efficiently open for four months, believing the brain to have become softened by the inflammatory action it had undergone. He considered his health, however, perfectly re-established two months before I allowed the issue to be healed. He became anxious to leave home for a change; and being afraid lest he should resume his habit of drinking a bottle of wine with his dinner, when out of my controul, I gave him a strict charge not to drink any intoxicating fluid; if he did, he would probably either die at a few days' notice, or get into a lunatic asylum, calculating that the brain had not recovered from the softened state; which prediction unfortunately proved true. After leaving Clifton ten days, news arrived announcing his death. He had drunk a considerable quantity of wine at Brecon; the next day pains in his head recommenced, with debility and tremulous movements; on the fourth day a vessel gave way in his head, creating apoplexy and death. A large coagulum was found in one hemisphere, and the brain quite soft and pulpy.

Fever.—I have very frequently had recourse to the incision in the advanced stages of continued fever, with the most satisfactory results; particularly in young subjects, where the disposition to serous effusion is naturally much stronger than in the adult.

A little girl, aged 12, was admitted into ward No. 2, in an advanced stage of fever, of the gastro-enteritic character; a diarrhœa of watery brown and fœtid stools, tense abdomen with great tenderness, tongue with transverse fissures and dry, sufficiently marked the mucous membrane to be in a state of ulceration. Proceeding, on came delirium during the night, and picking the bed clothes; the evacuations discharged involuntarily, and a state of unconsciousness. The incision was made in this state, and wine given; she immediately improved and readily recovered.

A second case of this kind occurred nearly parallel in all the circumstances. The subject was a girl, Joanna Kirk, aged 12, ward No. 1, with gastric fever, which ran on to a similar extremely severe condition; involuntary evacuations, insensibility, &c. The incision was made, whilst in this abject state, with immediate benefit and perfect recovery.

Thomas Mathews, aged 22, ward No. 5, is another case of fever, which was brought to a successful termination by means of the incision. After thirty days' labour with mercurials and other remedies, effusion and death appeared inevitable, but was stayed, and he perfectly recovered.

Muco-Enteritis.—Patrick Brown, aged 14, ward No. 7; after being under treatment ten days, a state of meningitis supervened, which threatened

his speedy extinction by effusion. The incision was made, and he left the house in fifteen days afterwards, perfectly well.

Hannah Parsons, aged 19, ward No. 1, admitted with gastric fever, dark, fœtid, and watery stools, and general indications of ulcerated mucous membrane. The disease proceeded, and symptoms of effusion showed themselves rather suddenly. The incision was made, and appeared to remove much of the heaviness and torpor, and so much improved her, as to give a favourable opinion of her recovery; on the fourth day after, although perfectly sensible, she fell into a state of collapse and died. The *post mortem* examination showed large ulcerations of the colon and cœcum, and a considerable quantity of serum in the ventricles of the brain, and at the base, and between the membranes, and the substance of the brain much congested with blood. In this case the incision was made rather too late.

Master H., aged 12, had the ordinary muco-gastric fever, with great determination of blood to the head, the meninges being inflamed. After sufficient depletion, the delirium and other symptoms of mischief still threatened so severely, as to induce me to order the incision. This was very well and properly done; but he was not watched or attended to during the afternoon and evening, so as to prevent him from pulling the bandage from his head and disturb the dressing whilst in a state of delirium. He lost so much blood that he sank the next morning from exhaustion. This case occurred in the year 1830, and induced me in future instances, when I felt apprehensive of a similar disaster, to have recourse to the actual cautery, as an effectual

precaution, and also as rather adding to the efficiency of the remedy.

The next case of fever I shall mention is one of scarlatina.

Mr. Mason, aged 20, had a sister lying dead in the house, and he was himself in a most perilous condition when I first saw him. He had delirium, picking the bed clothes, a frequent small pulse, with great prostration of strength, his throat much swollen, &c. The incision was made of the full and proper length, with immediate benefit; and he recovered readily, much to the astonishment and happiness of his parents, who had ceased to hope. In this case, as well as in others, the minor means of administering to the comfort, or of relieving the symptoms, were not neglected.

Erysipelas.—In the severe forms of this disease, affecting the face and head, and when the meninges of the brain become involved in its progress, and apoplectic symptoms are exhibited, this remedy is very valuable; indeed it has a double value: it affords the advantage of making the incision in a part affected by an unhealthy inflammation, whereby a healthy action is induced; as was ably shown by Mr. Lawrence, in a discussion upon this question some years ago at Bartholemew's Hospital, on a case of erysipelas in the arm; as will, doubtlessly, be well recollected. It has not only this advantage, but also the one of being a counter irritant to assist in protecting the brain. I shall give a case or two of this disease.

Mr. Needs, aged 38, had been bitten by a man at the angle of the jaw. Erysipelas came on, swelling the face and head to an enormous size,

causing delirium, and considerable coma. He had been depleted as far as possible, without relief. The incision was then made, with immediate benefit, and he rapidly recovered.

Mr. L. had erysipelas of the face and head, without any local cause of excitement. It was under treatment for many days before I saw him. I was called in on the accession of apoplectic symptoms. The case was very formidable in its appearance: great torpor, with stertorous breathing, which seemed to be progressing in spite of well-directed measures. To check it, I advised the incision to be made immediately, when the patient improved so rapidly that he was convalescent in four or five days.

It is unnecessary to accumulate cases of this kind. The advantages of this remedy are so conspicuous that I need not occupy more time and space by any further remarks.

I shall close my examples for the present by the detail of one other remarkable case, but which I am obliged to relate from memory, as the case book which contains this and several other important cases has been lost or destroyed.

A married woman, aged 30, was admitted into ward No. 3, with hysteria. Various remedies were used for some time, by which she had been relieved on former occasions; for she had been in the house under my care repeatedly before. On this occasion she did not improve, and became suddenly worse, having the appearance of being moribund, and was so represented to me by the house surgeon. I, however, pronounced it as only one of the extraordinary frolics of hysteria, and directed measures accordingly. Her countenance was collapsed, with

a leaden paleness; eyes half closed, with a dim lack-lustre appearance; the respiration resembled that of a person *in articulo-mortis:* there was a sudden convulsive inspiration, without being followed by any expiratory effort; the expiration was effected by the elasticity of the cartilages of the ribs bringing down the elevated ribs in a slow and gentle manner, like the quiet subsidence of a last expiration. After a long interval another such an effort was made; and in this way, and in this state, she lay four days. Various means were used, such as stimulating injections, &c. I did not see her the second or third day, being out of town. On my return, finding she was exhausting, the pulse having materially lessened, I then deemed it necessary to order the incision to be made in the usual manner, and in about an hour afterwards she awoke and rallied from that extraordinary state. I should observe, that nothing could be got down her throat during those four days; but on the following day, when I visited her, she expressed considerable indignation to me for having ordered her head to be cut. She lost all her hysteria very rapidly, and I never saw her in the house afterwards. The remedy appeared to have effected a permanent cure, at least of that malady.

ARTICLE V.

ON THE EMPLOYMENT OF EXTENSION IN THE TREATMENT OF FRACTURES OF THE SPINE; WITH A CASE.

BY WILLIAM HENCHMAN CROWFOOT,

Surgeon to the Dispensary, Beccles.

FRACTURES of the spinal column, with displacement of bone, have been so generally fatal, and the treatment of them by extension has been so objected to by most of the highest modern authorities, that it may be useful to record a case of *perfect* recovery, where the fracture and displacement of bone were unquestionable, and where the employment of extension formed an important part of the treatment.

The older writers, Oribasius, Parè, Scultetus, and Heister, were favourable to the use of extension in fractures of the spine; and some of them have figured in their works the apparatus they employed for that purpose. On the other hand, the more

modern authors have generally thought the practice useless, if not unjustifiable, and one which might produce an immediately fatal result. It was strongly objected to by the late Sir Astley Cooper, in his invaluable work on *Fractures and Dislocations;* and Mr. Samuel Cooper, in his *Surgical Dictionary,* speaks of it in equally unfavourable terms.

In the 17th volume of the *Medico-Chirurgical Transactions* a case of fractured spine is recorded by Mr. W. R. Barlow, of Writtle, in Essex, in which extension was used with decided advantage; the symptoms were greatly alleviated, and the patient survived the accident about a year and a half. An interesting account of the morbid appearances, on dissection, is added to the case.

In the 20th volume of the *Transactions* of the same society is a valuable paper on "Injuries of the Spinal Chord," by Sir Benjamin Brodie, in which that able and judicious surgeon mentions two cases in which attempts at reduction by extension were made with partial success; nor does he discourage its *cautious* employment, particularly where the injury is to the lower portion of the column.

In the treatment of fractures of the spine, it seems to me that there are two objects we should strive to obtain: the removal or diminution of the pressure on the chord, and the prevention of the inflammation which is likely to follow the injury, and which is itself so often the cause of death.

The lamented Sir Charles Bell has given very satisfactory reasons why the practice first recommended by Heister, and afterwards revived by the late Mr. Henry Cline, of cutting down upon the

fracture for the purpose of removing the depressed bone, should be abandoned. No other means seem, therefore, to remain for attempting to relieve the pressure, but the use of extension, gradually and cautiously made, and careful attention afterwards to rest and position. The inflammation should be met by the daily local abstraction of blood from the immediate neighbourhood of the injury. With these views the following case was treated, and with the happiest result :—

On the 5th of July, 1839, Anthony Callow, aged 42, by occupation a coachman, whilst driving a carriage through a covered gateway, was caught by a beam on the back of his neck as he was in the act of stooping forward ; and the horse rushing on, he was bent completely double. On the removal of the poor fellow from the box of the carriage his lower extremities were found to be *perfectly* paralysed : on an examination of the back there was discovered a great deformity about the ninth, tenth, eleventh, and twelfth dorsal vertebræ, occasioned by an increased posterior curvature ; the spinous processes of the ninth and tenth vertebræ were divided from each other considerably beyond their usual distance, the body of the ninth vertebra having been forced forward, whilst that of the tenth projected backwards. The abdomen became almost immediately distended, the ability to empty the bladder was lost, and there was a *total* deprivation of the power of voluntary motion and of sensation in the lower extremities. No doubt existed in my own mind, nor in those of my son and of the respectable professional men amongst whom I

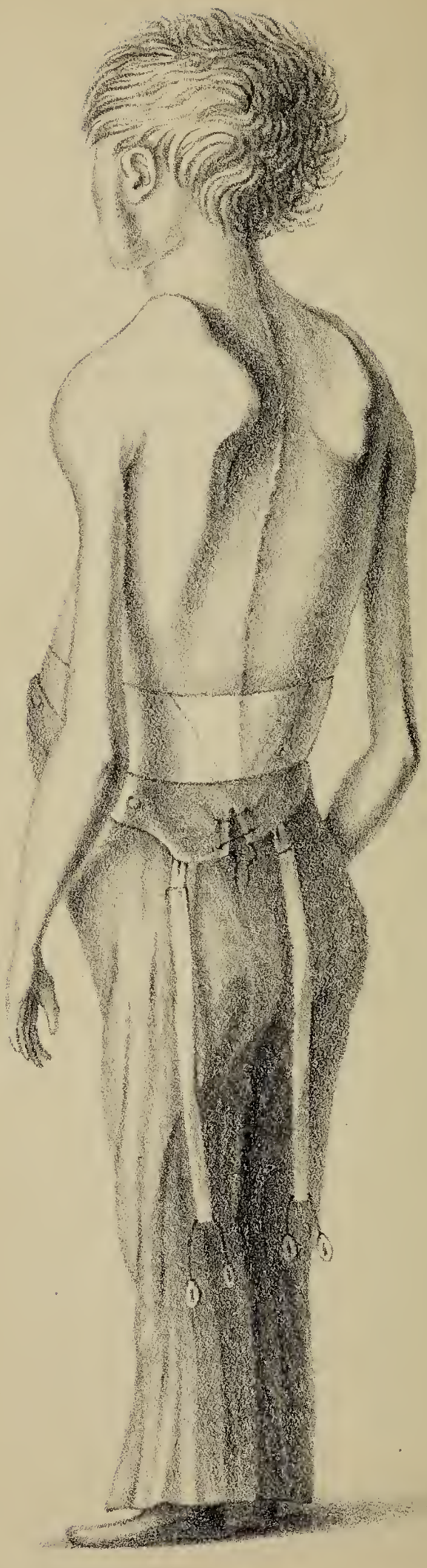
have the happiness to live, who were present, that displacement of the bones of the spine had taken place, and that there was pressure on the spinal chord. There was too much reason to fear that this case would terminate, as all similar ones which I had seen had done, fatally. Unwilling, however, to leave the poor fellow, who had but recently left my own service, without making some decided effort to relieve him, we determined to try the effect of cautious extension, and I applied it in the following manner :—

After the bowels had been emptied by an enema, and the bladder by the catheter, a broad and well-padded belt was passed around the chest, and under the arms, and it was fixed from behind to a strong staple at the upper end of the frame of the bed ; another equally broad and well-padded belt was buckled round the body, just above the pelvis ; this latter belt had two very strong straps attached to it, one before, the other behind, each having a strong iron ring at its extremity ; these straps were brought between the thighs, care having been taken to avoid pressure on the penis and scrotum, and made fast to the pullies. A gradual but considerable extension was now made, whilst some slight attempts were made by the pressure of the fingers to aid the replacement of the bones. The deformity of the spine was evidently diminished by the extension, whilst the pressure on the posterior tractus of the spinal chord was so far relieved, as to permit an almost immediate restoration of a certain degree of sensibility in the parts below the injury, where it had been entirely lost ; but there was not

the slightest return of the power of voluntary motion. An important point had, however, been gained, and a hope was excited that the spinal chord, partially relieved as it was, might gradually accommodate itself to the still altered form of the bony canal, and ultimately resume its functions, provided proper means were used to retain the amended position of the bones, and to obviate the inflammation which could not fail to follow such an accident.

The patient was placed on his back on a firm bed, in such a manner that his fœces could be removed without his being disturbed, and the most perfect rest was enjoined. For the first nine or ten days from six to ten ounces of blood were daily taken away from each side of the spine, alternately, with great relief to the feelings of the patient, who was most cautiously raised on his side by the sheet for the purpose, and afterwards as cautiously replaced on his back. The catheter was introduced two or three times a day for about a fortnight, when its use was no longer required. At this time the patient was accidentally seen by my old and valued friend, Mr. Dalrymple, of Norwich, who was not very sanguine as to the ultimate success of the treatment, though well satisfied with what had been already accomplished. The case went on favourably; the patient steadily improved, and at the end of three weeks he could slightly move the great toe of the right foot; in a few days after, that of the left foot, and gradually this power extended over the other muscles of the lower extremities and pelvis. At the end of two months from the time of the accident Callow was able to support himself upon his

legs with but little assistance; he slowly recovered the use of his lower limbs, and at the end of a twelvemonth was again able to mount his box and take care of his horses. Horse exercise, or walking any great distance, is apt to produce pain in the loins, and some degree of numbness in the limbs, but he is otherwise in perfect health, and is one of the best grooms in the country. There remains still some degree of deformity about the injured part, and an unusual separation between the spinous processes of the ninth and tenth vertebræ.



J. Perry lith :

Day & Haghe Lith.rs to the Queen

Mr. Banner's Case

ARTICLE VI.

A CASE OF

PARALYSIS OF THE SERRATUS MAGNUS,

WHICH CAUSED THE LOWER ANGLES OF THE RIGHT AND LEFT SCAPULÆ TO BECOME DISENGAGED FROM THE LATISSIMUS DORSI, &c.

BY JOHN M. BANNER, ESQ.,

Surgeon to the Northern Hospital, and Lecturer on Surgery at the Medical School of the Royal Institution, Liverpool.

Mark Barnes, aged 23, of low stature, and of healthy appearance, was admitted into the Liverpool Northern Hospital, under my care, on the 20th of June, 1842, with a projection of both scapulæ and an inability to perform certain actions with the arms.

He has all his life enjoyed good health, with the exception of the inconvenience arising from the paralysis, which was not preceded by, nor is it accompanied with, any pain in the head or spine, nor any diseased sensations in the skin or extremities, indicative of cerebral or central nervous lesion, by which the paralysis might be explained. He is a joiner by trade.

Eleven years ago he consulted me for the first time, experiencing at that period a slight difficulty

in raising the right arm above his head. This he felt more particularly when striking any object placed higher than his head. This loss of power gradually increased, and at the expiration of eighteen months or two years the base of the scapula on the right side was noticed to stand out from the back; and at the end of three or four years it assumed its present appearance. At the same time from the commencement of the attack the right lower extremity began to fail him, his gait becoming rather unsteady, and when in the bent position he experienced a little difficulty in raising himself.

About four years ago, being seven from the commencement of the attack, the arm of the left side became similarly affected, the scapula being displaced, and the lower extremity began to fail him as on the right side, though he has retained more power in the left arm than in the right. The circumstance which more particularly strikes the attention in the present case is the appearance of the scapulæ, more especially when the man attempts to raise and make use of his arms. In the quiescent position, the base of the bone, instead of lying parallel to the spine, is approximated to it at the lower angle, and stands out from the ribs a distance of two inches, leaving between the scapulæ a deep hollow; the upper angle being drawn high up into the neck, appearing on both sides, to the observer in front, midway between the shoulder and ear. The clavicle is in its natural position, as is also the acromion process of the scapulæ, to which it is articulated.

When the patient attempts to raise the arm, all these appearances are much increased. The base of

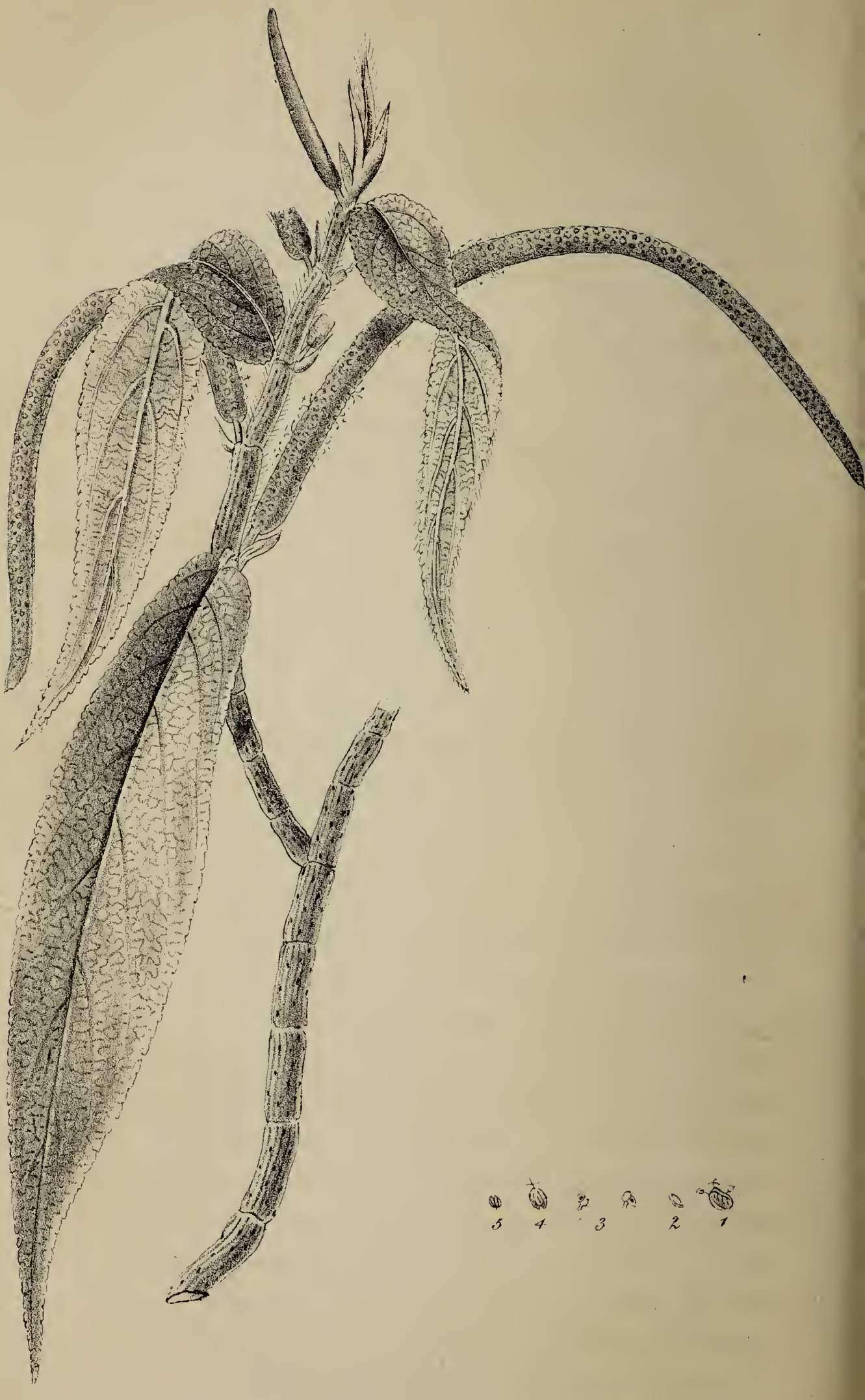
the scapulæ approaches nearly to a right angle with the spine, forming, with the base of the scapulæ of the opposite side, a very obtuse angle, and both stand out about three inches from the ribs; the arm cannot be raised beyond the horizontal position. After stooping to a right angle to the lower extremities, he is quite unable to recover the erect position without help, and there is an evident lateral curvature of the spine; both which may be consequences of the power of the longissimus dorsi, the sacro-lumbales, and the deep-seated extensors of the spine. In his ordinary position the upper part of the body is thrown back, evidently to balance the weight of the head and part of the body, which in the healthy person is supported in the completely erect position by the before-named muscles.

In analysing the action of the muscles attached to and influencing the movements of the scapulæ, it was observed that he could raise, and approximate to each other and to the spine, the upper angles of the scapulæ, showing a complete freedom of the trapezius, of the levator angulæ scapulæ. He can also approximate to each other the bases of the scapulæ, showing power in the rhomboidei. He can put his arms behind him freely and with force, proving that the latissimus dorsi acts powerfully, although from the tilting up position of the lower angle of the scapulæ, the slip of the latter muscle passing over that angle and assisting to bind down the scapulæ to the ribs, is most probably dislocated, and passes beneath it. There is no reason to suppose any paralysis of the teres muscles, as the action of drawing the arm to the side and backwards is performed with

ease. The sub and supra spinous muscles are very much developed, and the deltoid is of moderate size and retains complete power. The condition of the sub-scapular muscles can only be conjectured, yet they appear to be healthy and in good condition.

The only remaining muscle connected with the scapulæ, which has not been noticed, is the serratus magnus, whose function in the motion of that bone is, along with the deltoid, to raise the arm above the horizontal position, and making the insertion into the scapulæ, the fixed point, co-operate with the pectoralis major in those more energetic dilatations of the chest, which are, on occasions, required for respiration: the power of the muscle on both sides is completely destroyed, and this appears the most prominent lesion in the case. In elevating the arm above the horizontal position, this muscle takes up the action which has been carried so far by the deltoid, the supra and infra-spinatus, and the subscapularis. This action is to this extent perfectly performed; but the further action in the elevation of the arm (to effect which the subscapularis is absolutely necessary,) in this case is impracticable: the muscle, in consequence of its paralysis, is wasted, and can scarcely be distinguished. This is the case on the left as well as the right side.

The serratus magnus is supplied with a nerve, originating in the plexus, arising from the third and fourth cervical nerves, which Sir Charles Bell has classed amongst his respiratory nerves.



Piper Angustifolium. Matico.

Day & Haghe Lith.rs to the Queen

ARTICLE VII.

REMARKS ON MATICO,

A STYPTIC MUCH USED IN SOUTH AMERICA, FOR SUPPRESSION OF HÆMORRHAGE.

BY THOMAS JEFFREYS, M.D.

Read to the Medical Society, and also to the Literary and Philosophical Society, Liverpool, December, 1842.

Having already had recourse to active means to draw the attention of my medical brethen, both locally and generally, to the use of the plant *Matico,* well known in South America as a styptic, under the name of the "Soldier's Herb," I certainly did not intend to trouble myself further upon the subject by repeating my request, either to them or the public, had not an unfortunate circumstance occurred in my young mercantile friend's forwarding to me a seron of what he supposed to be *Matico,* which proved to be a spurious specimen, and which was sent to many members of the Provincial Medical and Surgical Association before I discovered the error. Although I lost no time in correcting the mistake, by sending circulars to every individual who had received a specimen, still I have reason to believe, that when I had procured a fresh supply

of that which I knew to be genuine, and used every means to circulate it for trial, I very much fear that the want of accuracy in the first instance may probably have lessened their zeal in giving it a fair trial, if not even have caused a total indifference to ascertain its real effects. This I trust will be a sufficient apology for my thus appearing before the medical profession and the public, more especially as I have instances to bring forward which convince me that its styptic powers are sufficient to make it a valuable auxiliary to that class of articles in our Materia Medica.

I am quite aware of the obstacles which the introduction of every novelty in the practice of medicine has to encounter, and I am too old in experience to expect infallibility in any remedy, come from whatever quarter it may; but I hold it to be the duty of every medical man, who believes that benefit may be conferred upon his suffering fellow creatures, to give trial to a remedy, furnished by the hand of the Creator himself, and justified by instances of its success. The cases in themselves may not be so formidable as to endanger life, yet they may be sufficient to cause great anxiety to parents and friends, and consequently, whoever gives his assistance, is only fulfilling one of the higher duties which should constitute a distinguished position in the medical profession, where harmony ought ever to prevail, in honour preferring one another.

A very trifling circumstance, and that quite accidental, first induced me to direct my inquiries to the subject, and the styptic powers of the plant

Matico; and when I did so, it was more as a matter of medical curiosity than as supposing them to be worthy of the attention of the medical practitioner, or that the remedy itself should be considered an article of mercantile speculation, as it has been for the last year or two. There are merchants in Liverpool now, who hold not less than thirty or forty hundred weight of the article *Matico,* a circumstance which has been one cause of rousing me to increased inquiry, although there may be those who fancy the spring of my efforts otherwise, when neither my labours nor my pecuniary outlay are ever likely to be rewarded. I should, however, here instruct those who may use the *Matico* that there are two sorts of the article imported, one collected when *green,* the other when *ripe* and of a more yellow appearance, which *latter,* I have proof beyond all doubt, both chemically and practically, to be the much more powerful styptic, consequently preferable. My first notice of the styptic power of *Matico* appeared in the *Lancet* of January 5th, 1839, page 567, of which the following is a copy. At that time I heard its name variously accented, *Matecô, Matica,* and *Matico*; the latter I now believe to be the most correct. It is also well known by the Spanish name of "Yerba Soldado," or "Soldier's Herb:"—

"To the Editor of the Lancet.

"Sir,—In the course of last year a young mercantile friend of mine brought with him from South America a small quantity of the leaves of a plant, which he stated was much used, and in

high repute, as a styptic of great power and efficacy, by immediately closing the extremity of a bleeding vessel in profuse hæmorrhage. At the same time he gave me the following account of its accidental discovery. 'A soldier, wounded in the field of battle, was left bleeding so profusely as to afford little or no hope of his surviving. The occurrence of syncope so far checked the hæmorrhage as to revive him and enabled him to perceive his threatened danger. He immediately exerted what little strength he possessed to fill the wound with grass and the leaves of a plant accidentally within his reach,* and the effects were so speedy and complete as to enable him to rise from the place where he fell, and he survived to record the means which he supposed had saved his life.' My opportunities of proving the truth of this information have neither been extensive nor frequent, but they are quite sufficient to induce me to draw the attention of surgeons to a trial of the remedy; and as the subject is familiar to every well-informed person who has visited South America, there can be no difficulty in procuring some leaves for further proof of its efficacy. I do not know that I should have troubled you with this communication had I not, within these few days, derived further information on the subject from Mr. William Wheelwright, a gentleman now in Liverpool, who has resided in that country for fifteen years, and is well known as the successful projector (now carrying into effect) of steam navigation in the Pacific, and also between Valparaiso, Panama, and England The name of the plant, from which the leaves are collected, is *Matico,* and it is to be met with in the Province of Chequas, the eastern extremity of Bolivia, where he says, it is not only used for suppressing the bleeding from wounds externally, but also as a diuretic, of which latter quality I have no knowledge; but I will not fail to use it the first favourable opportunity which may offer, should I be able to procure it in a larger quantity than I at present possess.

"I am, Sir,

"Your obedient Servant,

"Thomas Jeffreys, M.D.

"*Liverpool, December* 24*th,* 1839."

* The latter, upon examination, was found to be *Matico.*

At the anniversary meeting of the Lancashire Branch of the Provincial Medical and Surgical Association, held June 29th, 1839, I availed myself of the opportunity of reading the above letter to the members present, having had the account confirmed in a conversation I had with Mr. Scarlett, son of Lord Abinger, and author of *Travels in South America*. The subject interested the members of the branch considerably, some of whom, from the appearance of the leaves, supposed it to be a *Salvia*, or sage; but I was better informed by my friend Dr. Dickinson, lecturer on botany in Liverpool, that it was not a *Salvia* but a *Piper*, which he verified by reference to Cramer's edition of Persoon's botanical work, vol. i., page 32, where it is called "*Piper angustifolium*," and which I believe to be correct. I lost no time in endeavouring to procure a sufficient quantity of the plant to furnish my medical friends with the opportunity of judging for themselves, which was speedily answered by the receipt of a seron containing twenty pounds of it. I instantly forwarded, September, 1840, specimens of half-ounce papers by post to more than 132 individuals, and 18 hospitals or dispensaries; when shortly afterwards I had the mortification to discover that the seron sent me was either not *Matico* at all, or if so, certainly a spurious species of it. This error arose from a want of attention in the person I applied to for it at Valparaiso; and although I immediately sent a circular round to the 150 places I had sent to, apprizing them of this careless blunder, the effect of it, I have no doubt, caused any future attempt to introduce it to be looked at

with suspicion, if not with indifference, or entire neglect. I, however, pledged myself to remedy the evil as soon as I could procure the genuine plant, with anything like confidence of its purity.

This opportunity did not occur until the month of July, 1841, when I received intimation from a mercantile house in Liverpool, stating that they had received from their correspondent eighty serons of *Matico*, twelve of which were of a *green* colour, giving me the idea that it was collected before the plant had come to maturity: the other sixty-eight serons appeared to me to have been gathered when ripe, for the plant is not only of a *yellow* colour, but the seeds are far more distinct; and indeed this was further proved by the styptic power being greater, as evinced by chemical tests very carefully made for me by a skilful chemist,* from whom an ample supply may be obtained.

He proceeded to prepare an *infusion* of each, with *half-an-ounce to the pint:* that made from what I consider the younger plant, gave rather a darker colour than the *yellow* or ripe plant. The latter has a stronger smell and a more powerful taste, and by three chemical tests precipitates more than the *green* does, which was evinced as follows:—

1. A solution of peroxide of iron was added to the above infusion, which turned it quite black; consequently it contains most *gallic acid*.

2. A solution of sub-acetate of lead gave a yellow precipitate, showing the quantity of *mucilage*.

3. A solution of nitrate of silver, which also gave a dark grey, or nearly a black precipitate, which I

* Mr. Clay, 104, Bold Street, Liverpool.

believe was done with a view of showing whether it contained tannin; but as none was reported, I conclude that none was contained.

In each of these experiments the results were far more evident in the yellow or ripe plant than they were in the green, or that supposed to be younger, or less carefully dried. The original cost of the plant is very trifling, not more than 1*s.* or 1*s.* 6*d.* per pound, and it may be had from the merchant for 2*s.* 6*d.* or 3*s.* when in bond; but as heavy expenses are incurred by keeping it in Liverpool, it will not be retained here in large quantities, unless the demand for it should be both speedy and extensive. It is much used in Belgium, and sells there for 7*s.* 6*d.* per pound. I must again warn those who may use it, to be careful in obtaining the genuine *yellowish* ripe plant. The odour of the genuine is so powerful that it will be immediately detected by any one who enters the place where it is kept, and though powerful, is by no means unpleasant; some have thought the smell resembles that of cubebs.

BOTANICAL CHARACTERS.

The appearances of the leaf, to an ordinary observer, resemble that of a sage (*Salvia*), but a botanist soon discovers it to be a pepper. My friend, Dr. Kendrick, of Warrington, has evinced a zealous anxiety that the *Matico* should be accurately defined, both botanically and practically, having had experience of it himself quite sufficient to manifest its good effects. He applied to his botanical friend, Mr. Wilson, of Orford Mount,

near Warrington, well known to the public, who has favoured me with a correspondence which he has had with Dr. Walker Arnott, sub-editor of Sir William Hooker's *Botanical Journal,* to whom I have to offer my most cordial thanks for the information they have given me, and also for the ready offer of publishing my communication, which I should gladly have done before, had I not thought it desirable to wait for more convincing practical facts of the efficacy of the remedy, and the subject more suitable to a medical publication than to one purely botanical:—

Extract from Dr. Arnott's Note, Dated March 15, 1841.

"Since I wrote you last I have pounced upon a plant, lying loose with some others, from Peru, in Sir William's herbarium. It is marked '*Matico,* a famous styptic.' Now the plant is certainly *Piper elongatum,* (Vahl,) or *Piper angustifolium,* (Ruiz and Pav.); but your fragment (also a *Piper* obviously) differs in some little respects. Both may be the same. It is not now a *Piper,* but a *Stephensia* of *Kunth,* or *Artanthe* of Miguil. The styptic property is nowhere mentioned that I know; and it was about that, and how applied, that I wished for information. Had you sent that, I would have given a description of *Stephensia elongata,* and stated the reasons for that being the true *Matico.*"

In a note received from Dr. John Lindley, Professor of Botany, Apothecaries Hall, London, dated September 7, 1841, I received the following information:—

"The plant you have sent a specimen of, under the name *Matico,* is the *Piper angustifolium* of the Flora Peruviana. From that work we learn that its Peruvian name is 'Thoho Thoho,' and that it is used *ad gonorrhæas et ulcera cancrosa a lue venerea ortas, exterpandas,* in form of a decoction."

It was not, however, till about the middle of September, 1842, that I was enabled to procure a more accurate account of it, as above alluded to in the Flora Peruviana, in consequence of that work being both scarce and expensive. For this I am indebted to a friend,* who after an unsuccessful search in the college libraries of Glasgow and Edinburgh, found a choice copy of the work in the Advocates' Library of the latter place, and to whom I feel truly grateful for the subjoined extract, descriptive of its botanical character, which he copied, whilst his accomplished lady took a very accurate drawing of the plant, from which the accompanying plate is taken :—

Botanical Description of Matico.

Diandria monogynia.
Piper angustifolium.
Foliis cordato-lanceolatis acutis rugosis, spinis recurvis foliorum longitudine.

Frutex—biorgyalis.
Caulis—erectus, articulatus, nodosus, ramosus.
Rami—subdivisi, geniculati, articulati, subpurpurascentes, teretes, scabri, teneri, pubescentes, punctati.
Folia—breviter petiolata, cordata, lanceolata, acutissima, parum obliqua, basim-œquantia, integerrima, subtus pubescentia, mitia, super retrorsum scabra, utrinque venosa, reticulata, rugosissima, nervosa, nervis alternis.
Spathæ—lanceolatæ.
Spicæ—oppositifoliæ, solitariæ, recurvatæ, dum teneræ erectæ, foliorum longitudine, cylindricæ, saporis piperis nigri.
Stigmata—hispida.
Habitat—In silvis et ripis Huanuci, Cuchero, Panao, Chaclea, et Muna.

* R. E. Alison, Esq., London.

Floret—Julio, Augusto, et Septembri.
Vernaculi—Moho Moho, id est Nodus Nodus.
Vires et Usus.—Incolæ ad gonorrhœas et ulcera cancrosa a lue venerea ortas, extirpandas decoctum affatim hauriunt.
Explic.—1. Flosculus.
2. Squama.
3. Stamina.
4. Drupa cum Stylo.
5. Semen."

A healthy plant was sent me, but it died on the voyage, accelerated, no doubt, by the sailors plucking off the leaves to heal any accidental bleeding wounds; which fact I had from the captain of the vessel. It is generally raised from slips or cuttings, in consequence of the seeds not being so successful.

It may require both zeal and patience to ascertain its good effects, but that it has sufficient power to deserve the attention of the medical profession I have no doubt, and I have collected the following facts illustrative of its efficacy. They are by no means so extensive as I have been anxious to obtain; but when I consider the urgent wishes of a few of my medical friends, the apathy of others, and the difficulties I have to contend with among those who have to supply us with the genuine article, I am compelled to come forward sooner than I otherwise should have done, which I hope will be received as an apology for deficiencies.

My first trial of its external application was to a cut on the face from shaving, and other trifling cuts on the fingers, every day occurring, not requiring surgical assistance, when, if pressure be made with the finger for a short time, it never failed stopping the bleeding, the leaf succeeding better than

the powder; and let me here remark, once for all, that the *under* side of the leaf is more powerful than the *upper*.* I then proceeded to use it to leech bites, where the bleeding could not be stayed, a circumstance sometimes rather distressing in delicate infants, and uniformly with success. This has been confirmed to me by many of my medical friends, both in public and private practice.

October 28th, 1840, I received a letter from my friend Dr. Kendrick, of Warrington, to say, that he was hastily sent for to a gentleman who had cut his throat, and observing a small artery divided, which was not of sufficient importance to require being secured by ligature, but was large enough for the pulsation to be visible, and the hemorrhage from it so profuse as to require immediate attention, and having accidentally some *Matico* in his pocket, he applied a small portion of the leaf to the bleeding vessel; the effect of it was the speedy, nay almost instantaneous cessation of the flow of blood. This valuable fact I consider of great importance, as far as a solitary instance can go; and although it cannot be supposed sufficient to establish its efficacy, it is quite so to induce those who have an opportunity to encourage further experiment.

The next notice of it is from Dr. Monro, surgeon to the Dundee Infirmary, dated May 28th, 1842;

* If the leaf be moistened by steam and expanded for examination through a magnifying power, the *upper* side is of a dark yellowish-green colour, presenting an uniform papillary appearance throughout; if, on the contrary, the *under* side be so examined, the colour is of rather a brighter yellow, with a distinct reticulated appearance, the interstices of which are the *under* side of the papillæ, consisting of a fibrous spongy texture, from the expansion of which, it is probable, the styptic power so rapidly acts.

and although it has already appeared in the *Provincial Medical Journal* for June 18, 1842, page 209, I hope its introduction here will not be considered obtrusive :—

"Dear Sir,—I was favoured with your communication, containing the *Matico,* some time ago. I find you are naturally desirous of knowing the result of it in my hands. The circumstance of its being my year to officiate as attending surgeon to our Infirmary, has given me opportunities of using it more than ordinary in surgical cases. I have not administered it internally, but from what you state I shall certainly take the earliest opportunity of giving it a trial.

"It has been very often used after the application of leeches, where there was difficulty in stopping the oozing of blood, and uniformly with most decided success. One of these cases was that of our house surgeon, who had fever; and being a young, stout, and florid person, with early symptoms of head affection, leeches were ordered, which, by his own desire, were applied inside of both nostrils. The bites bled profusely, and there was a difficulty in stopping the bleeding: cold applications to the head, and plugging the nostrils, &c., were tried without effect; when the *Matico* in leaf was applied over the bites, *pressed* on with the point of the finger, the remedy proved immediately successful. This is, in my opinion, a good and decided case, happening in the person of an intelligent and experienced medical man. He describes the feeling produced by the leaf to be one of increased heat and throbbing, which continued for about five minutes, when all unpleasant sensations went off. Others, to whom it was applied, described their feelings as very similar to those just mentioned.* The *Matico* was also applied to a man brought into this hospital with a wound of the right temple; a considerable branch of the temporal artery had been divided. The wound was dressed, and a compress and bandage applied, but still the blood burst out; cold water was several times had recourse to, still the bleeding returned after awhile; at last the *Matico* was used. At first I stuffed the wound with the

* The sense of heat in the part when applied is a strong proof of its being likely to succeed.

powder, but found it not to answer so well as the leaf, being soon washed away from the wound in the vessel; I then pressed in several pieces of the leaves, holding them firmly for some time with the point of the finger. The result was, that we had no more hæmorrhage. We had a somewhat similar case of a man with a wound of a branch of the palmar artery, which resisted graduated compression and bandages, and in which the *Matico* was used with the best success.

"From these cases I cannot doubt but that the *Matico* has most decided qualities, and that it may become a very valuable addition to our Materia Medica. It will afford me pleasure if I can give you any further testimony of the effects of this substance, in which you seem to have a peculiar interest. I shall persevere in trying it in cases where I think it appropriate, whether medical or surgical. Mr. Crichton, my successor for the following year in the Infirmary, has promised to follow up the experiments with the *Matico;* and the house surgeon takes an interest in the matter, so that I hope to give you further proof of its good effects as a styptic.

"I remain, dear Sir,

"Yours, very truly,

"WILLIAM MONRO."

EXTRACT OF A LETTER FROM DR. KENDRICK, OF WARRINGTON, TO DR. JEFFREYS, OF LIVERPOOL, JUNE 8, 1842.

"On the subject of the cultivation of *Matico,* I procured as many seeds as I could from the packet I last received, and placed them in the hands of a gardener, on whom I could depend, for the purpose of sowing them. I am sorry to say not a single seed has vegetated, and that I suspect from the plant being gathered previous to their being fully ripened, as my friend Wilson, one of the best microscopic observers of the present day, has not been able to discover an embryo in any specimen he has submitted to examination. If so, we have no right to expect them to vegetate."*

* The information I have received from South America is, that *Matico* is raised from cuttings.

In another letter, July 27, 1842, he further says :—

"A lady of my acquaintance has taken up the subject very enthusiastically, and having *experimentally cut* her finger, applied the leaf of the *Matico*, and found that it was the *under* side of the leaf alone which possessed the styptic quality. I find on trial she is correct in her statement."

The following letter is from Dr. G. C. Watson, surgeon to the Liverpool Institution for Lying-in Women and Diseases of Females :—

"My dear Sir,—In compliance with your desire when you favoured me with a specimen of the *matico* for trial, that the result should be reported to you, I beg to state that I have given it the fairest trial I could in our hospital, Horatio Street. I consider, from the comparatively limited scale of experiment, that it has proved decidedly efficacious as a remedy in the subjoined instances; so much so as to warrant my confidence in it as a valuable addition to our stimulant and astringent class of remedies. I need not go into any particulars, but simply to give the nature and number of cases wherein on trial it has answered the expectations your account led me to form of its virtues :—

	CASES.
"Blenorrhagia	5
"Vaginal Leucorrhæa	3
"Uterine ditto (conjoined with a rubefacient liniment over the loins)	1
"Hæmaturia	1
"Hæmorrhage from the bowels	2
"Cynanche Tonsillaris	2

"And successful as a styptic in a case of *nævus*, after removal by double ligature, where one or two small vessels proved troublesome on its coming away. I used it *internally* and *externally* in general, according as the case admitted of it, in both instances confining myself to the one mode of exhibition by *infusion*. If my information be correct, it is best to begin with a small *dose* of it, gradually increasing it as the stomach gets accustomed to it; when I disregarded this point, nausea marked the disagreement of the remedy. It also appears to me, judging from two

instances, that after the dose has been pushed rather too liberally, the *really beneficial effect diminishes*, and physiological [quære pathological] symptoms, viz., feverish excitement and pains in the limbs and back, indicate the necessity of intermitting the remedy for two or three days; when, after a purgative, the medicine may be resumed with safety and final curative effect. It may be thought that the data for these observations on the physiological effects are insufficient to base any solid opinion upon; so they are, undoubtedly, and I only take the liberty of soliciting your own attention to them, in order that future investigation may be extended towards their verification, or the contrary, seeing that they have, if true, a direct practical import, as far as the suggestion of a guide to the exhibition of any remedy, with *adequate benefit*, goes. Begging your indulgence for so meagre a report, and promising not to forget you in any further trials of the same,

"I remain, my dear Sir,

"Your obedient humble servant,

"G. C. Watson, M.D.

"*Horatio Street, Liverpool,*
"*July*, 31, 1842."

From Dr. Scott to Dr. Jeffreys.

"Dear Sir,—I think I ought to communicate to you a very striking instance of the effects of the *Matico* leaf, which occurred to me yesterday, as I think its efficacy in stopping the bleeding of leech bites in young children, which is often very difficult to accomplish, is scarcely sufficiently known. It was the case of a child eight months old, labouring under acute bronchitis. The bite of the leech, which was applied to the chest, bled profusely, and resisted the usual means of stopping it; but by placing a piece of the leaf on the bite, and keeping it fixed by the finger for a few seconds, the hæmorrhage totally subsided, much to my satisfaction and the astonishment of the child's friends.

"Yours, very truly,

"*July* 31, 1842." "R. W. Scott.

From Mr. Oswald, Surgeon, Douglas, Isle of Man.

"My dear Dr. Jeffreys,—I have never thanked you for sending me a supply of *Matico* for trial, nearly two years ago. I now take the liberty of doing so, and of informing you that I have not lost an opportunity of testing it by experience. The first case that occurred was one of enlarged hip joint, from scrofula, with fistulous openings over the great trochanter, which frequently discharged blood copiously, and could not be suppressed by pressure, owing to the pain it gave the patient. I applied the *Matico* in leaf, so as in a great measure to suppress the bleeding; but the constitutional disease was too deeply seated. In bleeding gums, and leech bites in infants, sometimes very difficult to manage, I have no doubt it will be useful.

"The last case I used it in was one of excessive discharge of blood from the bowels, and had every reason to think that the hæmorrhage proceeded from a stricture or ulceration of the tranverse arch of the colon, or higher up in the intestine. The patient is greatly reduced by frequent and excessive loss of blood, great pain and constipation of the bowels, with all the concomitant symptoms of it. The *Matico* has been given in infusion three times a-day, and there has been less hæmorrhage since than under any other remedy. This patient thinks the infusion an exceedingly pleasant tea. I have now expended my stock of the leaf, and would feel greatly obliged by another supply in an envelope, by post, for I think I should lose no time in continuing the use of it in this case. With many thanks for past attentions,

"I remain, dear Doctor,

"Yours, very sincerely,

"*November* 16, 1842." "H. R. Oswald.

From the Same.

"My dear Sir,—I am most happy to be able to say, that the case of intestinal hæmorrhage, in which the *Matico* was prescribed, continues to recover. This lady had been subject to discharges of blood from the bowels for several years, and had been in Dublin for advice in 1841. Last summer the discharges had been so frequent and profuse, that at the beginning of November

she was reduced to the last stage of debility, and had been confined to her bed for many weeks. Under these circumstances I prescribed the *Matico,* in addition to the use of the longest rectum bougie, and *oleum olivæ,* as a mild laxative. The blood evidently came from above the descending colon, and was often preceded by scybala. Since the *Matico* has been administered she has experienced no serious discharge of blood; she had one about *ten* days since, which she ascribed to the exertion of walking up stairs.

"This lady and her sister are so well pleased with the medicine, that they gave a part of it, about a month ago, to a young lad who suffered from epistaxis *weekly*; and they informed me to-day, that the lad, after taking the *Matico,* had no bleeding at the nose for four weeks in succession, which he considered quite an event, and was only fearful lest the stoppage of blood might lead to some dangerous consequence; I, however, advised them to repeat it.

"During the last fourteen days, I have been using it in the case of a plethoric young female, 17 years of age, who is subject to profuse catamenia, about every fortnight; and also to frequent bleeding, sometimes daily, at the nose. I gave it first in form of powder, combined with small doses of the *sulphas sodæ,* but she disliked this form so much, that I abandoned it for the infusion. Her report this week is, 'the daily bleeding at the nose is not nearly so bad, and I am otherwise much better since I took the medicine, but whether from it or not, I cannot tell.' I advised her to give the infusion a longer trial. I am very glad that you have made your experience in the use of this herb public, and shall look for its appearance with much interest.

"I remain, my dear Sir,

"Yours, very sincerely,

"*December* 16, 1842." "H. R. Oswald.

Cases From Dr. Dickinson, of Liverpool.

A. R., aged 67, labouring under scirrhus uteri, has been liable for nearly a year to excessive occasional hæmorrhage from the diseased organ, with an abundant discharge of fœtid sanious matter in

the intervals between the hæmorrhagic attacks, which occurred generally every fifth or sixth day. The patient has been taking the infusion of *Matico*, conjoined with the tincture of conium, with the happiest effects for three weeks, in doses of two ounces, four times daily. The hæmorrhage has ceased for a fortnight, and the sanious discharge considerably diminished.

C. M. G., aged 36, has suffered from a gonorrhœal discharge for the last three months, for which she had used injections of sulphate of zinc, and taken copaiba, &c. After taking two ounces of the infusion of *Matico* four times daily for a fortnight, the discharge completely disappeared.

J. M., aged 35, has had a gonorrhœa for the last four months, for which he has been treated in the usual mode, having taken cubebs, copaiba, and used injections. He has taken the infusion of *Matico* for ten days, with very much benefit, although there is yet a very slight discharge from the urethra.

The following may be adduced, amongst others, as cases in which the *Matico* was of the greatest service :—

	CASES.
Gonorrhœa	3
Leucorrhœa	5
Menorrhagia	2
Hæmorrhoids (very severe)	1
Epistaxis	1
Catarrhus vesicæ	1

In two instances I was compelled to suspend the use of the *Matico*, as the plant appeared too stimulating. The one case being complicated with gastro-enteritis, and the other with urethritis. I

think that the active virtues of the plant are principally due to the essential oil.

B. C., aged 37, married, has been subject for the last two months to excessive discharges of pure blood and coagula from the vagina, amounting to nearly a quart in a few days, occurring every ten days or a fortnight, and followed by a serous or muco-purulent discharge: bowels free, tongue clean, the skin and lips blanched, pulse sixty and weak. This patient had for nearly a month been treated by the usual mode for such cases, but without any very decided improvement, when she began to take a wineglassful of the infusion of *Matico* four times daily, and in ten days had recovered from all severe symptoms; indeed is nearly perfectly well.

In confirmation of the above good effects of the *Matico* in intestinal hæmorrhage, I may mention that of my being called to a severe case of sanguineous dysentery, in the month of October, 1841, which required very active treatment for full two weeks; and at times the unfavourable symptoms caused great anxiety for the probability of its fatal termination. However the patient got quite well, and I had discontinued my attendance for one week, when I was hastily sent for, in consequence of his having had a profuse discharge of pure blood, with scarcely any feculent matter in the stools. I immediately prescribed a *decoction* of the *Matico*, in the proportion of *half an ounce* to the *pint*, and directed *three* tablespoonfuls every four or six hours, three doses of which completely suppressed the hæmorrhage.

I may also mention that the daughter of the last patient was attacked with laryngitis, for which ten leeches were applied with great relief, but the oozing of blood from some of them could not be stayed; I immediately applied compresses made wet with the decoction ordered for her father, and the good effects were almost immediate. I have been asked for formulæ for its use. Externally, I believe the *under* side of the *leaf* is preferable to the powder, and more powerful than the smooth or upper side. Internally, the decoction or infusion may be safely given, *half* an ounce to the *pint*, and the dose, three tablespoonfuls, increasing the strength to *one* ounce to the *pint*, gradually; suspending its use for a day, and substituting a gentle purgative; but if it produces nausea, it should be omitted for a few days.

Mr. Clay, chemist, Bold-street, Liverpool, has prepared a tincture of it, with *two* ounces to a pint of proof spirit, and which I should think a convenient and useful form, but I have no experience of it myself.

ARTICLE VII.

ANATOMICO-CHIRURGICAL OBSERVATIONS

ON

DISLOCATIONS OF THE ASTRAGALUS.

BY THOMAS TURNER, ESQ., M.R.C.S.L.,

Surgeon to the Manchester Royal Infirmary, Lecturer on Anatomy, Physiology, Clinical Surgery, &c. &c.

It could not for a moment have been imagined by the author of this paper, when he was requested to make to the members of the Provincial Medical and Surgical Association, assembled at Exeter, an oral communication of a singular case of Compound Luxation of the Astragalus, which had come under his observation and treatment, that so much interest would be excited by the remarks elicited on that occasion, as to induce the proposal that he should prepare a paper on the subject for publication in the next volume of their *Transactions*. The request, however, was complied with : the author, therefore, will endeavour to accomplish his task in the best manner his knowledge, research, and leisure will allow.

As dislocations of the astragalus are accidents of unfrequent occurrence, in comparison with many

others which happen to the human body, (Dupuytren never having, in his extensive practice, met with more than twelve cases,) it may appear to many that the author's time might have been more profitably employed, and his labour more fruitfully bestowed, in bringing before the profession a subject of more general interest, and of greater practical utility. But, in looking over the list of surgical accidents, there is not one more serious in its characters and in its consequences than dislocation of the astragalus; and there is not one in which we are so destitute of rules, to guide us in our practical proceedings. The author is not alone in this opinion; as the fact was confirmed by the remarks made by the distinguished President of the Association, and by many of its members, when they did him the honour to listen to his lecture.

On examining the manner in which the astragalus is connected with the tibia, fibula, os naviculare, and calcaneum, it appears almost impossible to conceive otherwise, than that dislocation of this bone *alone, i. e.,* without displacement of the other bones of the foot, or fracture of one or both malleolar processes, is as impossible as luxation of the ribs; and that to speak of its occurrence was to imagine, rather than to realize the fact, which was, we have reason to believe, the case with the ancients who wrote on dislocations of the ribs: but, although luxation of the astragalus *alone* is, comparatively speaking, an uncommon accident, yet we know that it does occur; therefore we shall, at all events, escape, in commenting upon it, the animadversions passed on the older surgeons, for writing elaborately

on accidents which, we presume, they never saw. In works of surgery of bygone days, we meet with some subjects detailed with the greatest care, confidence, and minuteness, which modern surgeons have almost altogether expunged from the catalogue of casualties: thus, whilst Heister, Petit, and Duverney, have written largely on, and discussed very fully, the subject of luxation of the ribs, most surgeons of the present day deny the possibility of such an accident; and for many reasons, the most cogent of which is, that the force necessary to produce luxation would more readily occasion fracture, and thus the violence communicated would be expended in the latter effect. There does not exist on record a well-authenticated instance of dislocation of a rib, either at its vertebral, or its sternal extremity, as the result of force: how comes it, then, that ancient surgical writers have so minutely described the nature of this accident—have even given its varieties, and the mode of treatment adapted to each of them? They never could, in reality, have seen a case; therefore must have mistaken fracture, or some other injury, for dislocation. But, whilst the older surgeons fell into one extreme, in detailing what they fancied *might* occur, and thus prepared their minds to meet the exigencies of the case, when it actually happened, we should be careful not to allow the infrequency of dislocation of the astragalus to induce an opposite error; for although it may fall to the lot of a few surgeons only to witness a case of this kind, yet the embarrassment experienced will be very great to those who do witness it, unless they are armed with

some authority that will help them to decide on the means applicable to each variety of this accident. But, however important, necessary, and useful, general principles are, they may require modification; therefore, much must still here, as in other cases, be left to the judgment of the practitioner. In the treatment of violent injuries, general (as the constitution and habits of the patient) as well as local circumstances must not be overlooked; since that line of practice which may be justifiable in one case, or even in the majority of cases, may not be admissible in all. It is an admitted fact, that general principles must now and then be modified; but still, if founded on truth, they never can altogether be departed from. In modern surgery, facts established by correct observation, and a better knowledge of anatomy, have taken the place of theory; whence, although the domain of surgery has been abridged, (so far as erroneous opinions gave to it the appearance of extension,) another step has been gained towards its scientific advancement. It is to the refutation of vague statements, and to the establishment of sound practical principles, that our attention must, in the present day, be directed; and it is with the hope of lending his humble assistance towards the accomplishment of the latter object, that the author presumes to offer some observations on the following queries, which involve very many important practical considerations:—

1. What are the anatomical relations of the astragalus, and in what manner do they influence the accidents to which this bone is liable?

2. By what powers or kind of forces are dislocations of the astragalus produced?
3. In what directions can the astragalus be luxated?
4. What forms of luxation are, and what are not reducible?
5. What are the obstacles to reduction in most cases? and, lastly,
6. Since reduction is impracticable, in almost all cases of dislocation of the astragalus, by what principles are we to be governed in the treatment of this accident?

In bringing these subjects before the members of this Association, and the profession at large, the author is anxious to assist in rescuing the surgeon from the painful dilemma in which he may be placed, for want of established rules to guide him in the arrangement and treatment of accidents occurring to the astragalus; respecting some of which, we are left, by our best surgical authorities, in no inconsiderable degree of doubt and difficulty.

ANATOMY, &c., OF THE ASTRAGALUS, AND ITS CONNEXIONS.

Bones.—The astragalus is the bone of the tarsus, on which the tibia rests: it therefore presents an articular surface above for the concavity of the tibia; and another, on its inner side, for the malleolar process of the same bone; whilst the fibula is applied to its outer surface, forming the malleolus externus, and at its under part, there are two articular facets for the calcaneum; thus, by means

of these two bones, the superincumbent weight of the body is transmitted to the ground. It is important to remark here, that the articular surfaces between the astragalus and the os calcis are in the same perpendicular line as those of the tibia and astragalus; a point of consequence to attend to, as it explains, what we might *â priori* suppose, that the *shortening of the leg is the invariable effect of a complete removal of the latter bone.* Lastly, the astragalus presents, on its forepart, an articular convex facet for the os naviculare; whence it has six cartilaginous surfaces, but is connected with only four bones—there being two surfaces for the tibia, one for the fibula, two for the os calcis, and one for the navicular bone. There are formed by these bones three articulations, the ankle joint, an articulation between the astragalus and os calcis, and one between the astragalus and navicular bone; and it will be observed, that there are three synovial capsules, and that the greatest extent of the superficies of the bone is covered with smooth cartilages, by which the astragalus is rendered much more moveable than any other tarsal bone, and therefore much more liable to dislocation; which accident would, indeed, be less frequent than it is, if it were not for the presence of strong ligaments (implanted into rough processes) which tie it firmly to contiguous bones. It is, perhaps, worthy of notice, that the synovial capsule of the ankle joint is, naturally, exceedingly loose and extensible, and contains more than the ordinary quantity of synovia; whence the author presumes the astragalus may be partially luxated, without laceration of the capsule of the joint.

Ligaments.—The astragalus is joined to the tibia by the internal lateral, or deltoid ligament, which expands in its descent, and is inserted into the os calcis as well as into the astragalus. There is also an anterior ligament, which is attached, above, to the fore part of the tibia, and below to the astragalus. On the fibular side of the ankle joint is situated an anterior ligament, which passes from the fibula to the astragalus; and behind is the posterior ligament of the fibula, which is attached above to the malleolus externus, and below to the back part of the astragalus. Thus, four ligaments pass from the bones of the leg to the astragalus; but the remaining ligament of the ankle joint, (the external, middle, or perpendicular,) which goes from the fibula to the os calcis, must not be overlooked; for, as stated by Dr. Quain, "The astragalus being wedged in between the malleoli, and the lateral ligaments passing downwards from these to the os calcis, both lateral ligaments must contribute somewhat to retain the astragalus in its proper position with regard to the latter bone." In complete dislocation forwards, the anterior ligament must give way; and should the lateral ligaments not yield at the same time, they must be thrown into a very tense state, and by thus firmly embracing the body of the astragalus, or by diminishing the space backwards, between it and the tibia, will increase the difficulty of reducing the bone, when luxated, to its natural situation. In dislocation forwards and inwards, the anterior, wholly or in part, and the internal lateral ligaments, must yield; and, in dislocation forwards and outwards, the anterior and fibular ligaments will be broken

through, unless, in the former case, the tibia, and in the latter, the fibula, be fractured at the same time that the astragalus is dislocated, which accompaniment sometimes does, and sometimes does not, exist. In dislocation backwards, when the bone is thrown between the tibia and tendo-achillis, all the ligaments will, in all probability, be lacerated: this, one might suppose, must be the rarest of all the forms of dislocation occurring to the astragalus, as the posterior tibio-fibular ligament deepens the articulating surface of the tibia and fibula, and must offer great resistance to injuries occurring to the foot; still, four cases of this accident have been recorded. Besides the ligaments connecting the astragalus with the tibia and fibula, there are others which tie it to the os calcis and navicular bone: between the two articulating surfaces in the os calcis, there is a very deep sulcus, which is occupied by a strong ligamentous structure passing from bone to bone, and constituting a firm bond of union between the astragalus and os calcis, independently of a posterior and an external lateral ligament. The astragalus is secured, in its connexion with the os naviculare, by means of a broad band of ligamentous fibre, which passes from the upper surface of the former to that of the latter bone; and, lastly, it should be mentioned, that in the sole of the foot there exists a dense ligament, called by Mr. Bransby Cooper the "sub-astragalar," which, although connected, more especially, with the os calcis and os naviculare, serves to strengthen the tarsal joints. Its texture is very firm, being fibro-cartilaginous; and, from possessing the physical properties of

elasticity and flexibility, it is of importance, in preventing mischief to the foot, from the less violent injuries to which this part of the body is exposed. In all the forms of complete dislocation which happen to the astragalus, the ligaments connecting it with the os calcis and navicular bone must be ruptured; the sub-astragalar excepted, which may, from its elasticity, escape laceration.

It is not necessary to advert to the comparative resistance offered by the various ligaments to the dislocations which occur, as the course which the bone takes is determined by the nature of the violence, and the direction which the wrench and muscular action give to the leg and foot; but the extent of laceration of ligaments and soft parts is a matter of no mean consideration in determining the propriety of removing the bone in complete dislocation, whether simple or compound. When the astragalus has been excised, the bones of the leg may still be held in connexion with the foot by a portion of the internal or deltoid ligament, which is attached below to the os calcis, as well as to the astragalus, and by the perpendicular fibular ligament: all the rest must be sacrificed; but the divided and lacerated remains of the other ligaments may form adhesions to the parts with which they are brought into immediate contact, and thus may prove a future auxiliary bond of union between the bones of the leg and the navicular and heel bones of the foot. Seeing how firmly the astragalus is tied to the bones of the leg, and to the os calcis and os naviculare, it seems almost impossible to conceive how any force could cause this bone to

be tilted out of its normal situation, in the manner we know it to be in its simple and compound dislocations. Of this accident so many cases have been recorded as to leave no doubt on this point; and I shall add another instance, which has recently come under my own observation and treatment, at the Manchester Royal Infirmary; and which, from the direction in which the bone was thrown, is, so far as my knowledge and reading extend, without a parallel.

MUSCLES CONNECTED WITH THE FOOT, AND IMPLICATED IN ITS DISLOCATIONS.

Above the bones and joints of the instep is situated the extensor brevis digitorum communis muscle, which arises (partly fleshy and partly tendinous), from the os calcis, and terminates in four slender tendons, which pass inwards to the great and three adjoining toes. This muscle is not materially implicated in dislocations, except in the circumstance of its tendons being displaced, if not ruptured, in luxation directly forwards, and forwards and inwards; and in that of drawing, in some measure, the toes outwards, and the metatarsal bones triflingly backwards, when the astragalus is removed.

Superimposed on the former muscle, and running in their thecæ to the four lesser toes, are the tendons of the extensor longus; which, when the astragalus is dislocated forwards and outwards, will be either ruptured, or separated, so as to girt the bone; and in excision of the astragalus, this common extensor of the smaller toes will assist the

former muscle in drawing the second and third toes, the cuneiform, and navicular bones, a little backwards.

The tendon of the tibialis anticus runs to its destination on the inner part of the foot. In dislocation forwards, the bone will, in all probability, separate this tendon from that of the extensor proprius pollicis, which is situated between that of the tibialis anticus and the tendons of the long extensors of the toes; the astragalus would thus be girt by these structures, and fixed in its new situation. Behind the articular surface of the tibia there is an oblique groove, along which the tendon of the flexor longus pollicis passes; this groove is bounded on the inner side by a rough process of bone, which gives attachment to a strong posterior ligament. The flexor longus pollicis, the flexor longus digitorum communis, and tibialis posticus, run to their respective destinations, behind the inner ankle, and alongside the inner surface of the astragalus; but the first of these muscles only can be said to have an attachment to it, and this is merely by the implantation of some of its tendinous fibres into it, in common with the navicular and three cuneiform bones.

The peroneus longus and peroneus brevis, which pass behind the malleolus externus, are not in contact with the astragalus; but they, and the other muscles of the foot and toes, will have the course of their tendons so diverted, when the astragalus is luxated, as to encroach on the astragalar space, and thereby form one of the impediments to reduction; and the peronei will powerfully aid the muscles,

which send their tendons behind the malleolus internus, in pulling the foot towards the tibia and fibula, when the astragalus is completely dislocated or extracted, and thus tend to obliterate the space originally occupied by this bone: but this effect is considerably promoted by the gastrocnemii which are inserted into the protuberance of the heel.

ON THE MOTIONS OF THE ASTRAGALUS, AND THE OPERATION OF FORCES IN THE PRODUCTION OF ITS DISLOCATIONS.

If we examine the mechanism of the ankle joint, it will be seen, that although the united tibia and fibula form the concavity for the os astragalus, and thus produce a mortise-like articulation, the fibula bears no part in transmitting the superincumbent weight of the body. The under surface of the inferior extremity of the shin-bone rests vertically on the astragalus, and the astragalus on the os calcis; thus, the arch of the former bone receives the weight, and transmits the same, through the medium of the calcaneum, to the ground. The os calcis constitutes the posterior abutment of the plantar arch; the head of the metatarsal bone of the great toe forms the anterior and inner; and the cuboid, and the whole range of the metatarsal bone of the little toe, and its phalanges, form the resting point of the outer edge of the foot. Mr. Dodd (in the *Cyclopædia of Anatomy*, vol. 2, page 257) satisfactorily explains the advantage of this arrangement of the outer side of the foot. He is of opinion, that it is to a certain extent required, in consequence of the construction of the toes, these

being weaker and shorter, as well as their metatarsal bones, as they are further removed from the great toe: as their strength, therefore, diminishes, the corresponding part of the arch is shortened and flattened, and consequently less strain is thrown upon them, until, at the base of the little toe, the arch of the foot is obliterated, and what weight is resting here comes at once upon the ground. The astragalus is susceptible of movements on the leg, and on the heel, and navicular bones of the tarsus; but the motions at the ankle are mainly limited to backwards or extension, and forwards or flexion. When the foot is forcibly extended on the leg, the astragalus is brought into close proximity with the posterior edge of the tibia and tibio-fibular ligament; the convex articular summit of the astragalus is brought forwards, and the anterior ligament is stretched upon it. When the foot is powerfully flexed on the leg, it is prevented from passing beyond certain limits, by the anterior edge of the shin-bone coming into contact with the neck of the astragalus; and in this case, the posterior and the middle fibulo-tarsal ligaments (improperly called perpendicular) are rendered so tense, that a little additional flexion would tear them, together with the posterior fibres of the deltoid or internal lateral ligament. It is obvious, however, that too great a degree of extension and flexion of the joint is prevented, not so much by yielding and lacerable textures, as by the approach of bone to bone; to overcome which, would require a considerable force. Lateral movements of the foot upon the leg do not exist, in any appreciable degree, in the living

subject, when the binding structures possess their natural retaining property. The motion of the astragalus on the os calcis is of a gliding kind, forwards and backwards, and from side to side: the first of these happens when the foot presses the ground, and the second when the pressure is taken off; and it is probable that this last effect is much assisted by the elastic property of the sub-astragalar ligament. The movements between the astragalus and os naviculare are, mainly, those of turning the sole of the foot inwards and outwards; the former results from the action of the muscles which run behind the malleolus internus, and the latter by those which pass behind the malleolus externus; and in these movements the articulation between the os calcis and os cuboides participates; whence, dislocation of the astragalus from its scaphoid cavity is likely to occur, if this joint be violently wrenched by a sudden inversion or eversion of the foot. When the ankle is extended in the greatest possible degree, fully one half of the upper articular surface of the astragalus is exposed; a violent impulse now given to the os calcis would be immediately and directly communicated to the astragalus, and thus the ligaments may be torn, and the bone dislocated forwards; and if we examine the obliquity in direction inwards and forwards, which a force applied to the heel would produce, we can easily imagine why the astragalus may be ejected from its situation forwards and inwards on the navicular bone, more readily than forwards and outwards on the os cuboides.

Violent extension of the foot is, in most instances,

the cause of dislocation forwards. In one case given by Baron Dupuytren, dislocation forwards occurred in consequence of jumping from the top of a coach, and the patient pitching on his heel with all his weight. Other cases are recorded of dislocation forwards, forwards and inwards, and forwards and outwards, in persons falling from heights, and pitching on the heel, or sole, or side of the foot. Doubtless, in some of these cases the main concussion is received on the calcaneum, which is thrown by the foot into sudden extension, and the astragalus is thrust by the heel bone from its situation at the ankle. When the foot is fully flexed upon the leg, and a force applied to the superior part of the tuberosity of the os calcis, and to the under surface of the fore part of the foot, the astragalus might be thrown backwards, an effect much favoured by the extreme depression which the heel would experience, the greater distance at which the astragalus would be separated from the tibia, and consequently the increase of space gained backwards for the escape of the bone. The mode in which dislocation backwards may, in this way, occur, is well illustrated in the case of Mr. Goss, of Bristol, where, it would appear, the foot became forcibly flexed; in which occurrence, as already remarked by Mr. Phillips, the axis of the tibia becomes oblique in relation to the articular surface of the astragalus, in front of which the shin-bone is precipitated, in obedience to the impulsion which it receives from the weight of the body. This fact is equally confirmed by what occurred in the second case given by the same author. Here the patient, whilst running very

rapidly after a cricket ball, caught his foot in a gutter which was unobserved, on the further side of which the toes rested, while the heel was jammed directly into it, and in this state he fell forwards. The effect in this instance, as in the last, would be that of powerful flexion of the ankle joint. If the foot be forcibly inverted, the astragalus might be dislocated forwards and outwards, or directly outwards; and if everted, the luxation might be forwards and inwards, or directly inwards. We may thus theorize with respect to the manner in which direct and indirect luxations happen, from the operation of *direct* forces and actions; but we cannot so easily determine and estimate the mannner in which *indirect* action and forces operate, not merely in tilting the astragalus from its natural locality, but in altering its relation or axis, by inverting, everting, or retroverting the bone.

In calculating and reasoning on the causes which produce dislocation, we must not confine our inquiry to the mere effects of a direct force applied, nor to the influence of direct muscular action. It must be admitted, that in some cases mere violence will lacerate the ligaments, and other connecting textures, and produce dislocation. The author presumes, however, that this is a very unfrequent occurrence: but if violence be continued, with a favourable coincidence of muscular contraction, dislocation may take place; but this accident is most frequently due to the irregular spasmodic action of muscles, which must be liable to modification from a variety of causes, especially from the position of the joint at the time the injury was

received, and the manner in which the muscles may thereby be affected. These remarks will, I presume, help us to an explanation of the causes of direct dislocations of the astragalus forwards, backwards, outwards, and inwards; but they do not throw sufficient light on the subject to enable us to account for the deviation in axis, or position, which the astragalus experiences in many cases of luxation of this bone.

However difficult it may be for us to form a conjecture, yet it is quite certain that the astragalus *alone* may be dislocated. This accident was known to Duverney, who details a case where this bone was pushed with so much violence (as the result of strong compression) that it became detached from the other bones, and pierced the flesh of the foot, causing thereby an insulated compound dislocation. Portal alludes to this accident as a very singular one; and it would seem, that when he published his *Anatomie Médicale,* a similar case had not occurred in his practice. According to Dr. Morris's statistics of dislocations in the Pennsylvania Hospital, only one case occurred in ninety-four instances of luxation; but the author thinks that the proportion is more likely to be 1 in 500 cases. Dr. M. does not state in what direction the bone was dislocated, or the treatment adopted; but it is recorded that the patient died in consequence of the injury. There is scarcely a displacement of any joint of the body, the mechanism of which, or of the cause or causes which produce it, may not be more or less satisfactorily explained. With respect, however, to dislocation of the astragalus *alone*, either

with fracture of one or of both bones of the leg, or what is more remarkable, without any fracture at all, ingenuity cannot clearly explain the *modus operandi* of the different species of violence, which are mentioned by writers, as having given rise to this accident. If they be analyzed and closely examined in their mechanical bearing, they appear hardly sufficient to explain the effect, except in those cases where there is a breaking up of all the binding textures of the bone. At all events, if we can conceive how dislocation occurs when the tibia and fibula are fractured, and there is more or less laceration of the ligaments which unite the os calcis and os naviculare with contiguous bones, thereby loosening their connexions, it is almost inconceivable how the astragalus can be dislocated *alone*, without fracture of the bones of the leg, or either of them, and without displacement or loosening of the tarsal bones; yet such has been the case in several instances.

Mr. Phillips prefaces the detail of his very interesting cases of dislocation of the astragalus backwards (to which we shall presently advert) with some remarks on the difficulty of conceiving the *modus operandi* of force, or of forces, by which luxation of the astragalus is effected. In his cases the astragalus was dislocated backwards, the dislocation being complete and simple, with scarcely any disturbance of the relative position of the other bones. Mr. Phillips expresses his astonishment at such an occurrence, and illustrates the difficulty with which this displacement is accomplished, by showing that we cannot, by any force applied to

the foot, bring about a similar result. He says, "If we take a leg, and place the foot (in a wooden shoe) in a vice, screw it there, so that no motion shall be permitted, and then apply any quantity of pressure backwards or forwards; once arrived at the natural limits of these movements, the pressure still continued, we shall experience a powerful resistance; this, however, may be overcome, and a very loud crackling noise will be produced upon the articulation, which has been the subject of experiment; if the pressure has been forward, by which the leg will have been flexed upon the foot, we shall find the posterior fibres of the lateral ligaments ruptured, but no displacement of the astragalus; and we shall obtain the same result if we make the leg the fixed point, and then forcibly extend the foot upon it." Mr. Phillips supposes that such a degree of violence should produce luxation of the foot backwards or forwards; but we shall always find that all our attempts in this way to produce dislocation will be in vain. Admitting that we could (but the author doubts the possibility of it) effect luxation at the ankle joint, this circumstance will serve in no way to explain the insulation or isolated detachment of the astragalus. The violence necessary to dislocate the tibia and fibula from the astragalus, in other words, to produce complete dislocation at the ankle joint, must be much greater, even in the dead body, than that employed in Mr. Phillips's experiment; and much greater still in the living subject, where muscular resistance enhances the difficulty in a considerable degree. During the horrors of the French revolution, amongst other heinous cruelties

practiced on the victims of revolutionary fury, attempts were made to tear them limb from limb; but with all the force that could be exerted by animal and mechanical power, disarticulation could not be effected; the knife, therefore, was had recourse to for the accomplishment of this diabolical object. We cannot, by any experiment, illustrate or imitate the mechanism of dislocation. Anatomy informs us of the projections and irregularities in the articular boundaries and surfaces; whence we infer the greater ease with which dislocation may happen in one direction than in another. Anatomy teaches us the greater strength of the ligaments, and of the other binding textures in connexion with one articulation, than with another; whence we infer different degrees of liability to dislocation, according to degrees in these respects. Almost without exception, the more moveable an articulation is, the fewer its connecting structures; the reverse of which we might expect to be the case, if we were not to bear in mind that great strength is incompatible with great extent of motion; whence, to give this last advantage to the shoulder, strength is sacrificed, and additional liability to accident incurred. According to statistical reports, dislocation of the humerus from the scapula is a more frequent accident than dislocations of all the joints of the body taken collectively; and it is not difficult to believe this statement, if we examine the anatomy of the shoulder joint, and also the circumstances on which its great extent of motion depends. Finally, in reference to the mechanism of dislocation, there are powers concerned in its production

which we cannot always adequately appreciate ; and it must be borne in mind, that in all experiments we employ direct brute force on dead matter ; whereas, in the living subject, forces may be, and are frequently, indirect in their operation ; whence results are modified, and these will be still more modified by the active influence of muscles, which may, almost always, be regarded as the agents of dislocation.

ON THE DIRECTIONS IN WHICH THE ASTRAGALUS HAS BEEN DISLOCATED.

According to recorded and communicated cases of dislocations of the astragalus, this bone is susceptible of being displaced :—

Forwards,
Forwards and inwards,
Forwards and outwards,
Upwards and outwards,
Outwards,
Inwards,
Backwards, and
Outwards, downwards, and backwards.

It will be useful, as a preparatory step to detailing the different cases which the author has collected from published works, through the kindness of his professional friends, and from other sources, to inquire into the

RELATIVE ANATOMY OF DISLOCATIONS, AS PRODUCING THE SIGNS, AND INFLUENCING THE RESULTS OF THESE ACCIDENTS.

The study of the abnormal conditions of the astragalus, *as the result of force,* will not only teach us the signs of the different forms, directions, and

kinds of luxation, to which this bone is liable, but it will enable us to understand the mechanical difficulties which the contact of irregular processes and concavities opposes to its reduction.

The author of this paper will employ the term *form* as applicable to dislocation, in being incomplete or partial, or complete : the term *course* refers to the direct or indirect ejection of the bone from its articular surfaces ; the latter implying a change in the position or axis of the astragalus, in being everted, inverted, retroverted, or turned upon itself: and the term *kind* is adopted in reference to the simple, compound, or complicated nature of the accident.

When the astragalus is *partially luxated forwards*, the inner hook-like process, bounding the posterior or outer articulatory process for the calcaneum, is received into a hollow between the two articulating processes of the latter bone ; and the posterior surface of the astragalus is brought into contact with the anterior, instead of the posterior facet of the os calcis. In this way the navicular facet of the astragalus juts forward, and above the anterior range of the tarsal bones, and rests upon the schaphoid bone ; there is a considerable vacuity at the inner part of the foot behind the astragalar cavity of the navicular bone, and below the malleolus internus. The tibia and fibula will, in all probability, be carried forwards so as to increase the distance between the tibia and tendo achillis, thus lengthening the heel, whilst the foot and toes are turned inwards ; or the tibia and fibula may remain partially supported by the posterior part of the astragalus, and thus be prevented from descending on the os calcis, as they do in complete luxation.

In partial dislocation forwards and inwards, the relative position of parts does not very materially differ from that which happens in luxation directly forwards.

In *partial dislocation forwards and outwards,* the hook-like process of the astragalus presses against the rough root of the anterior, or inner articular surface of the calcaneum, the anterior facet lying over the cuboid bone; and in this, as in the other instances forwards, and forwards and inwards, there is a remarkable hollow at the inner part of the foot, and the bones of the leg are thrown forwards or backwards; the heel is accordingly lengthened or shortened, and the foot and toes are inverted.

In *partial dislocations upwards and outwards,* the progress of the bone forwards is arrested by the posterior surface of the os astragalus coming into contact with the cavity of the schaphoid bone; the bone rests partially, but principally, on the os naviculare, and a small part may be brought to bear on the os calcis. The bone is very prominent and much raised in the instep, so as to be readily mistaken for complete luxation: but here, as in all cases, the distinction is easy, if we examine the calcaneum and the position of the bones of the leg; indeed, the author is of opinion, that if this diagnostic distinction be neglected, and the prominence of the bone taken as the ground of judgment, we may often confound the incomplete with the complete form of this accident; a circumstance, he is inclined to think, of not unfrequent occurrence.

In *partial dislocation outwards,* the inner hook-

like process at the under part of the astragalus is received into the hollow between the two articular surfaces of the os calcis; the astragalus projects on the outer part of the foot; the fibula may or may not be fractured; the vacuity at the inner and hinder part of the foot will be greater than in dislocations forwards; and the foot is inverted.

In *partial dislocation inwards,* the outer hook-like process of the posterior articular surface of the under part of the astragalus, is received into the inner part of the rough depression between the calcaneal articulating facets. The astragalus will project at the inner side, and there will be a void at the upper and outer part of the foot. In these lateral luxations the foot will be turned either outwards or inwards, but more frequently inwards, and the heel is raised.

In *partial dislocation backwards,* the inner pointed process of the astragalus passes into the depression which is situated behind the acute summit of the posterior edge of the posterior articular facet of the os calcis, and between it and the elevated ridge at the upper part of the tuberosity of the heel. The bones of the leg may be carried a little forwards, or backwards, according to the state of the ligaments; the length of the heel will be accordingly increased or diminished; and in the latter case, a vacant place will be seen at the fore part of the ankle joint. In these cases, it is to be presumed that the heel will be but triflingly raised, and the foot but slightly inverted.

In *complete and direct luxation forwards,* the bone is tilted out, so as to rest partly on the navicular,

and partly on the two outer cuneiform bones. The exceeding prominence of the bone on the instep is an unequivocal feature of this accident; the tibia and fibula are drawn towards the hollow in the os calcis, vacated by the astragalus; and the fibula is received upon its outer side. But, as the measurement of the tibia, from before to behind, is scarcely more than one half that of the astragalus, it cannot occupy the whole of the cavity, therefore the heel is lengthened; and as the leverage is increased, the tuberosity of the os calcis is much drawn upwards. The new articular surfaces for the tibia are formed by the hollow facet of the os naviculare before, (into which the fore part of the under edge of the shin bone is accurately fitted,) and the anterior part of the hollow of the calcaneum below. The base of the new concavity is partly bony and partly ligamentous, bone being wanting between the os naviculare and os calcis, at the interior and inner part of the base of the foot. The anterior edge of the tibia is received into the hollow of the schaphoid bone; the inner malleolar process is situated between the tuber of the os naviculare and the jutting edge of the anterior and inner part of the os calcis; the prominence of the inner malleolus is thus rendered less salient and conspicuous, and its lowest point assists in forming the arch of the plantar region of the foot, all which circumstances are accurately delineated in the plate.* The malleolus externus rests on the outer side of the os calcis, therefore is lower and less prominent than when in natural contact with the astragalus.

In *complete and direct dislocation forwards, for-*

* *Vide* plate i.

wards and inwards, forwards and outwards, upwards and outwards, outwards, inwards, backwards and outwards, downwards and backwards, there will be, of course, differences induced, arising from difference of locality with respect to the luxated bone. The signs, therefore, of these accidents will of necessity vary; but in all *complete* dislocations, whether simple or compound, direct or indirect, there will be no deviation from what is stated to happen with respect to the tibia and fibula; namely, that the foot will be approximated to them by the action of muscles; that the tibia will occupy a part of the hollow which has been vacated by the astragalus, and that the leg will accordingly be shortened one inch or more, correspondingly to the depth of the bone which has been dislodged from the ankle joint.

In *partial, as well as in complete luxations,* the astragalus may be normal in position, or it may undergo a *change of axis with respect to its articular surfaces.* It is easy to conceive, that it is not a matter of indifference whether the one or the other of these conditions exists, as it regards the successful issue of attempts at replacement. In the most promising cases, the latter of these states of the bone would offer an almost insuperable barrier to reduction. Dupuytren alludes to it as a most formidable association with luxation of the astragalus; and that in almost all the cases in which he found it expedient to extirpate, malposition or altered axis rendered nugatory all attempts to reduce the bone to its natural situation. In partial dislocation, where the bones of the leg are fractured, and the ligaments torn, so as to give increased space

and more power and command over the parts, inversion, or eversion, or even the turning over upon itself of the astragalus, might not be an insuperable obstacle; but in complete dislocation, whether simple, or compound, or complicated, with fracture or not, and especially in the second case, reduction is, the author thinks, almost impracticable. Luxations of the astragalus, partial as well as complete, direct and indirect, may be *simple*, or *compound*, or *complicated*. Incomplete dislocation is rarely compound; and, what we might not *à priori* expect, even complete dislocation is more frequently simple than compound. The truth of Sir Astley Cooper's observation, "A simple dislocation of the astragalus sometimes, though rarely, occurs; a compound dislocation is still more rare," is not, however, fully confirmed in the collection of cases in this paper; for it will be seen, that the average of simple to compound is not much, if at all, in favour of the former; but we shall find, that the proportions are not the same in all the localities in which dislocation occurs; the reason of which, is to be inferred from an examination of the

SUPERIMPOSED TEXTURES IN THE DIFFERENT ASPECTS OF THE FOOT AND ANKLE.

It is a matter of great importance, in connexion with the different dislocations, to inquire into the nature of structures in the sites of these accidents; for, although the superjacent laminated textures, over the ligaments, are much the same in all of them, yet they vary in density and property, in such a way as to be capable of modifying results.

Thus, in dislocations forwards, the astragalus may be partially, indeed wholly, thrust from between the bones of the leg and calcaneum, without breaking through the skin and tissues below it; although we know, from observation and recorded cases, that (with few exceptions only) the pressure of the bone, in its abnormal situation, will cause, sooner or later, the integuments to give way, and the astragalus to protrude. In one of Baron Dupuytren's cases, where the bone was luxated forwards, the dislocation was simple, and remained so; and in cases, given by Baron Boyer and others, of luxation forwards and inwards, the bone did not break through the skin; and where the anterior range of the tarsal bones has been separated from the astragalus and os calcis, by the fall of heavy weights on the forepart of the foot, the dislocation has been of a simple kind. The cause of the resistance offered by the soft parts may be attributed to the yielding nature of the skin on the dorsal aspect of the foot, and to the strength and elasticity of the loose sub-cutaneous reticular web. The sub-cellular fascia, although strong, is nearly inelastic; this, therefore, together with the tendons and their thecæ, may be ruptured; but the more elastic textures which lie above them at the instep, and to which we have just adverted, will sometimes remain in a state of integrity, tightly stretched over the projecting bone.

Dislocations inwards and outwards are, most frequently, of a simple kind, as the strength and tenseness of the sub-cutaneous textures are such as will prevent the bone from being at once driven through

them: thus, in almost all the cases which the author has met with of dislocation inwards, the accident was simple; but, in most of them, the astragalus sloughed, and the bone was either partially or wholly excised. In Mr. Lawrence's valuable "Lectures on Surgery," allusion is made to a case of dislocation inwards, where the astragalus sloughed out. It is to be observed, in explanation of this fact, that about the inner malleolar region, the cellular tissue is more scanty and less lax than it is at and about the outer ankle; whence, in one case of dislocation outwards, which occurred to Mr. James, of Croydon, the bone remained in its new situation, without making its way to the surface; but there is not a single instance on record, of luxation inwards, where this result manifested itself.

Dislocation backwards is always simple, and always remains so, according to the examples of this accident which have been published; and when we examine the soft structures, and their anatomical relations to other parts, which occupy the space between the posterior boundary of the joint and the tendo achillis, this fact admits of ready explanation. It cannot fail to strike the reader of the cases of dislocation backwards, that in no one instance was the luxation compound; nor did the bone ulcerate its way to the surface, but it quietly rested in its new locality: it is, therefore, interesting to enquire into the reason of this circumstance. Posteriorly to the joint is situate the tibio-fibular ligament, which may or may not be torn; behind the ligament is the deep fascia of the heel, which is regarded as continuous with

the fascia profunda of the leg; connected with this structure is a good deal of lax cellular and fatty texture; behind which is the tendo achillis, covered with another fascia, and which is united by the sub-cutaneous cellular texture with the skin of the heel: lastly, the skin in this region is thicker and stronger than in any other part about the ankle joint, whence, it offers a considerable obstacle to the protrusion of the bone; and it must not be overlooked, that the interval between the posterior part of the tibia and the tendo achillis is sufficiently spacious to give occupancy to the dislocated bone, without much removal of the tendon of the heel, and without direct pressure on the integuments of this region. In one instance, it is stated by Mr. Phillips, "that the tendo achillis was pressed by the astragalus, so as to form an angle of forty degrees, and where at one point the bone had reached so near to the surface that vesication was produced directly over it;" but still the astragalus did not slough or become exposed. Mr. Smith, surgeon to the Leeds Infirmary, has kindly favoured me with the result of his experience on this subject. He states, "that he has seen several cases of dislocation backwards, but in no instance has he known the bone to slough, or any attempt to be made by nature to throw off the dislocated bone, as in those cases where the astragalus has been luxated in the anterior aspect of the foot." He also states, that his colleague, Mr. Teale, has had a case illustrative of the same important fact.

The extreme rarity, too, of dislocation of the ankle backwards is a proof of the resistance which

the textures of the posterior part of the joint offer against displacement. The author has never seen a case, and no example of this accident is given in works on surgery, except in one instance presently to be alluded to. Mr. A. Adams, who has written a valuable article on "Abnormal Conditions of the Ankle Joint," in the *Cyclopædia of Anatomy*, (a work most ably conducted by Dr. Todd, of King's College,) is of opinion, that dislocation of the bones of the leg backwards, whether complete or incomplete, is an accident of rare occurrence. Boyer, in his valuable work on surgery, gives no case of it from his own practice, and observes, that no author, in his knowledge, has done so. Sir A. Cooper says, that he has seen the tibia dislocated forwards, inwards, and outwards, but never backwards; and Baron Dupuytren states that he never met with this accident. The sole case on record is published by Professor Colles of Dublin, and it is the only one that ever occurred in his extensive practice; and here the dislocation was merely partial. In this case the tibia seemed thrown partially backwards from the articular pulley of the astragalus; the fibula was unbroken, and was also carried backwards with the tibia; the foot (measured from the instep upon its dorsum) was longer than that of the opposite side; the heel was shorter and less pointed; the space in front of the tendo achillis (near to the os calcis,) was partially filled up; and a hard swelling occupied the lower and back part of the tibia, which was evidently formed by a quantity of callus, which had cemented together the fragments of a fracture of the lowest part of the tibia; and the leg was

shorter than the opposite limb. The man did not apply to Stevens's Hospital until the bones were united in their new and faulty position, therefore Professor Colles knew nothing of the history of the case, but conjectures, from appearances, that it was one of dislocation of the tibia and fibula backwards. Mr. Syme, in his very useful work, *The Principles of Surgery,* when speaking of dislocation of the astragalus, gives it as his opinion, that this accident does not admit of reduction, and that the bone must be removed. He adds, "if an opening has not been caused by the accident in the first instance, one ought to be made without delay, in order to anticipate and prevent the violent inflammation which will otherwise occur, as the precursor of sloughing or ulceration, by which the loose astragalus must make its escape." As a general rule, in *complete* dislocations, the author believes the opinion of this excellent surgeon to be quite correct; but he would venture to state, that luxation backwards is an exception to the universal adoption of this line of practice.

EXAMPLES OF DISLOCATIONS.

Having now completed his anatomico-physiological views of the normal conditions of the astragalus, and of the causes which produce, and the signs which denote, its abnormal changes as the result of force; the author will next endeavour to illustrate these subjects by a detail of some of the most interesting and instructive points connected with published and unpublished cases of these accidents.

In giving examples of dislocations of the astragalus, the author will relate his cases according to the following arrangement, which will comprehend all the forms, directions, and kinds of luxation which have occurred in practice, and will facilitate the institution of comparative views as to the forms, directions, and kinds of dislocation which have happened in the different regions of the foot :—

1. Partial, direct, and simple.
2. ——, ——, and compound.
3. ——, ——, simple, and complicated.
4 ——, ——, compound, and complicated.
5. ——, indirect, and simple.
6. ——, ———, and compound.
7. ——, ———, simple, and complicated.
8. ——, ———, compound, and complicated.
9. Complete, direct, and simple.
10. ———, ——, and compound.
11. ———, ——, simple, and complicated.
12. ———, ——, compound, and complicated.
13. ———, indirect, and simple.
14. ———, ———, and compound.
15. ———, ———, simple, and complicated.
16. ———, ———, compound, and complicated.

I. DISLOCATIONS FORWARDS.

Case 1.—*Partial, Direct, and Simple.*—A case of partial dislocation of the astragalus occurred in a gentleman in this neighbourhood, who was attended by the late Mr. Thorpe, surgeon to the Manchester Royal Infirmary, where a portion of the bone was removed, and there now remains a very useful foot; indeed, the patient walks with scarcely any degree of lameness.

Case 2.—*Partial, Direct, and Compound.*—Dr. Wallis, of the Bristol Infirmary, has kindly communicated to the author the result of a case of this kind, which came under the care of Mr. Lowe, surgeon to the Infirmary, where the head of the bone was removed, and the remainder reduced, and the case did well.

Case 3.—*Partial, Direct, and Compound.*—Mr. Smith, of the Leeds Infirmary, has favoured the author with the following case, with others of great interest:—

Isaac Brierley, aged 22, was admitted an in-patient April 7th, 1826, for an injured ankle, caused by a fall of earth whilst he was at work in a pit. It happened on the 7th of February. The part was very much inflamed when the patient was admitted, and a small wound was discovered near the ankle. In about three months (suspecting the astragalus to be displaced) the opening was enlarged, and a small portion of the bone removed; but in a short time afterwards the wound degenerated, and sloughed to a considerable extent, but having soon nearly healed, he was made out-patient.

August 5th, admitted again.

October 11th, wound entirely healed; but the ankle joint is quite stiff and painful on setting the foot to the ground.

Case 4.—*Partial, Direct, and Complicated.*—In the *Lancet* for February 3d, 1827, under the head "Guy's Hospital Report," there is given a disputed case of dislocation of astragalus forwards. Without pretending, of course, to decide the question between the contending parties, (two such eminent men as

the late Sir A. Cooper and Mr. Key,) the author thinks it may be instructive to detail the case, as it shows, at all events, that a doubt may be entertained with respect to the existence and non-existence of this accident.

"There is at this time, in Cornelius ward, a case on which some difference of opinion exists as to its nature. Sir Astley Cooper considers it to be a 'well-marked instance' of a comparatively rare accident—partial dislocation of the astragalus. The patient is a young man, and was admitted under the care of Mr. Key, a few weeks since, in consequence of having received severe injury to the right leg. The accident occurred from the man having fallen from a height of six yards to the ground, and alighting on his feet. There was so much tumefaction immediately following the injury, that when the patient was admitted, and for some time after, it was certainly difficult to ascertain the precise nature of the injury done; crepitus was indistinctly felt at a short distance above the ankle, and in front of the joint was a considerable hard swelling. In the course of a few days, after the application of leeches, discutient lotions, and the observance of rest, the general swelling had so far subsided as to admit of a more accurate examination being made. It was now apparent, upon handling the limb, that the tibia was fractured at a short distance above the joint, and the fibula also broken at about two inches higher up the limb. The malleolus externus and malleolus internus were found to maintain their relative situation; but in front of the ankle joint there was a bony projection, equal in magni-

tude and much resembling in figure the forepart of the astragalus. Various and forcible attempts were made to reduce this swelling, but without effect; and the case was therefore simply treated in reference to the fractures. There is nothing material to remark on the progress of the case, only that the fractured bones became united in about the usual space of time, and at the period of making this report they appear to be firmly consolidated; but the tumour on the instep remains, and hence a question arises as to its nature. We have before said that the malleoli preserved their relative situations—such is the case now. The foot (if we except the swelling on the instep) is not deformed; there is the customary lateral motion, flexion, and also extension, but more especially the former is made with some difficulty. Sir Astley Cooper's opinion of the case is, that the bone projecting at the instep is the astragalus; which bone, he says, is thrown forward, whilst, at the same time, the lower portion of the tibia has receded. Mr. Key, on the other hand, considers that the swelling is occasioned by a fracture, with consequent displacement of the lower portion of the tibia, *i. e.*, its articulating portion, which has advanced; whilst, at the same time, the malleolus internus is left entire, and in its natural situation."

The author cannot find any subsequent report of this case; the probability is, therefore, that its nature remained undecided up to the period of the patient's discharge from the hospital.

Case 5.—*Complete, Direct, and Simple.*—In the first volume of the *Medico-Chirurgical Journal*

there is a case given of dislocation of the astragalus forwards, which occurred under Baron Dupuytren. On examining the limb, there was found on the fore part of the foot a hard prominent tumour, which proved to be an irreducible luxation of the astragalus; the bone was cut away, and the patient recovered with anchylosis of the bones.

Case 6.—*Complete, Direct, and Simple.*—I am indebted to Mr. Gaskell, late resident medical officer of the Manchester Royal Infirmary, and now medical superintendent to the County Lunatic Asylum, for the following case in which reduction was accomplished.

The accident above-mentioned occurred in a middle-aged man, who sustained the injury by a fall from a considerable height. The astragalus was dislocated forwards, and lay under the integuments and tendons of the dorsum of the foot. The dislocation was apparently perfect, many of the projecting points and surfaces of the astragalus being perceptible through the skin. The bone was reduced after persevering for some time in drawing down and flexing the foot, and also in making pressure upon the astragalus. It passed into its place suddenly, and with an audible snap; a bandage was applied, and the limb placed upon a splint; neither pain, swelling, nor other signs of inflammation occurred, and in three weeks the patient was able, with the use of a stick, to walk across the ward, and ultimately recovered the perfect use of his limb.

Case 7.—*Complete, Direct, and Compound.*—The case of Thomas Toms, communicated by Mr.

Green to the late Sir A. Cooper, presents a perfect illustration of compound dislocation forwards: here the head of the astragalus, which was torn from the articular surface of the os naviculare, protruded through the divided integuments; here all attempts at reduction failed, notwithstanding there was a free division of the skin. The difficulty seemed to arise in the capsule of the joint, and in consequence of the bone being tightly held by the tendons of muscles. In this case, the extraction of the astragalus was had recourse to at the recommendation of Sir A. Cooper, and in from three to four months (notwithstanding a good deal of constitutional disturbance, from the formation of abscesses and other causes) the patient was capable of performing, to a considerable degree, the flexion of the foot on the leg, but could not extend it. He was discharged from the hospital in less than four months after admission, and soon after resumed his business as a bricklayer.

Case 8.—For the following case of this accident I am likewise indebted to the kindness of Mr. Gaskell:—

Thomas Santer, aged forty-four, fell through several trap doors in a cotton factory, and alighted on the edge of a large tub. The integuments, anteriorly to the ankle joint were extensively lacerated, the astragalus had passed through the wound and remained attached to the limb by a mere shred of membrane, which extended from the dislocated bone to the external lateral ligament. The limb was amputated, and the patient ultimately recovered.

Case 9.—*Complete, Direct, Simple, and Complicated.*—Baron Dupuytren mentions a case where dislocation of the astragalus forwards was complicated with fracture of the tibia and fibula, and where the reduction was accomplished.

Case 10.—Baron Boyer relates in his *Traité des Maladies Chirurgicales* the case which occurred to Monsieur Aubray, Chirurgien en chef at the Hotel de Dieu, de Caen, of a patient who suffered from luxation of the foot, combined with fracture of the fibula, and where it was likewise discovered, subsequently, that the astragalus was both fractured and dislocated. The surgeon removed the astragalus, which was followed by a free discharge of matter, and the case terminated favourably in anchylosis of the foot.

Case 11.—Mr. Beever, late house surgeon of the Manchester Royal Infirmary, has kindly furnished the author with the following case, illustrative of the advantage afforded to attempts at reduction, when additional space is gained by fracture, associated with dislocation of the astragalus:—

Josiah Barlow, of middle age, robust in health and appearance, but said to be intemperate in habits, whilst following his employment as a brick-setter, fell from a considerable height, and alighted upon the right foot. The violence of his fall seems to have been received entirely upon the os calcis, and caused a comminuted fracture of that bone, and tilted the head of the astragalus upon the navicular bone, without producing any apparent injury to the soft parts. The reduction of the dislocation was effected without difficulty by exten-

sion and rotation of the foot. There was some consecutive fever with much local inflammation, requiring the application of leeches, and his recovery was protracted by the tedious exfoliation of two or three small fragments of the fractured bone; but ultimately he quitted the hospital with a slight halt only in his walk.

II. DISLOCATIONS FORWARDS AND INWARDS.

Case 12.—*Complete, Direct, and Simple.*—It is recorded in Sir Astley Cooper's valuable work, that the first case he ever saw was one of this kind, and the limb was amputated; the bone was thrown forwards and inwards, on the os naviculare. It was on the occasion of seeing this limb on the table of the dissecting room, that Sir Astley exclaimed, "surely that limb might have been saved."

Case 13.—Baron Boyer has published a similar case to the above, where reduction was impracticable. Nothing, however, was done; and although the deformity continued, there was no lameness.

Case 14.—*Complete, Direct, Simple, and Complicated.*—The following case is given by Sir Astley Cooper:—On the 24th of July, 1820, Mr. Downes had the misfortune to dislocate the astragalus, by falling from his horse. Mr. West, surgeon at Hammersmith, who was called to the patient, made an attempt to reduce the dislocation, which he could not effect. The patient was largely bled, and the limb placed in splints; Goulard's lotion was applied and an anodyne given. The patient felt great pain, and a sense of pressure against the skin and liga-

ments, on the evening of the accident. On the following day (the 25th) Mr. Ireland, who had visited Mr. Downes the evening before, called upon Sir A. Cooper, and requested him to accompany him to see the patient, and to meet Mr. West. When Sir A. C. examined the limb, he found the astragalus dislocated forwards and inwards, and the fibula appeared to be broken a little above the joint; Sir A. C. made an attempt to reduce it, but found the bone immoveably fixed in its new situation, projecting, so as to make the nature of the case perfectly clear, and bearing so strongly against the skin that a slight incision would have exposed it. Sir A. Cooper's first impression was, that he ought to dissect away the astragalus; but aware of the resources of nature in accommodating parts under luxations, and in restoring the limb to usefulness, he observed to Mr. West and to Mr. Ireland, that he would not operate, and that, perhaps, the skin might give way, and the bone become exposed, when he would be justified in removing it. The astragalus gradually became dislodged, the ligament sloughing or ulcerating. In September the patient was able to be removed to London. On October 5th, 1820, Sir A. Cooper again saw him, and finding the astragalus very loose, removed it with forceps, dividing only some slight ligamentous adhesions. The bleeding was trifling, and was suppressed by the application of lint alone. In October, 1821, he had a slight motion at the ankle, which has been slowly increasing.

Case 15.—*Complete, Indirect, and Simple.*—Baron Boyer gives the following case:—

A man, aged 36, fell from his horse, and was dragged by the animal, at full gallop, with one foot in the stirrup. The astragalus was turned inwards upon the tibia, and the head of the bone was carried forwards; the Baron attempted to reduce the bone, but without success; therefore, he abandoned it to nature, to wait the event. He considered this step preferable to the practice of excising the skin and ligaments, because, even if he did so, the luxation of the bone was such as to render reduction impossible. The patient went on well until about the eighteenth day, when the skin reddened, and subsequently sloughed, and exposed the head of the astragalus. It seemed that the ankle joint was seriously involved, consecutively, in the mischief, therefore it was considered prudent to amputate the limb, and the patient recovered.

III. DISLOCATIONS FORWARDS AND OUTWARDS.

Case 16.—*Partial, Direct, and Simple.*—Through Mr. Milner, M.R.C.S., the author has learnt that a partial dislocation of the astragalus occurred in the practice of Mr. Taylor, Oldfield Lane, and the bone was reduced.

Case 17.—*Complete, Direct, and Compound.*—A case of dislocation of the astragalus has been communicated by Mr. Milner, where the bone was completely luxated, and where partial reduction was effected by means of force used with a pair of forceps. In this case there was permanent inflexibility of the foot, and the heel was elevated three inches from the ground.

Case 18.—A third case, communicated by Mr. Milner, is one of complete and compound dislocation forwards, and a little outwards, without fracture. Reduction was impossible; the bone, therefore, was cut away, and the patient did well.

Case 19.—The fourth case communicated by Mr. Milner is the one which the author visited, in consequence of the solicitation of a friend of the patient. He found that the bone had been excised by Mr. Taylor, for an irreducible dislocation of the astragalus. The accident occurred at Haslingden, in this county, in consequence of a fall from a height, and the weight of the body coming on the os calcis. The patient was a very unfavourable subject for any accident or operation. He died from phlegmono-erysipelatous inflammation, which commenced about the foot, and extended up the leg and thigh, although the case was judiciously managed by incisions, &c.

Through the kindness of Mr. Milner the author has obtained information as to the cases of dislocation of the astragalus that have come under the notice of Mr. Taylor, of Oldfield Lane, and he thinks it right to subjoin Mr. Milner's letter on this subject:—

"Dear Sir,—I beg to acknowledge the receipt of your note of the 23rd instant, respecting dislocations of the astragalus. The case of compound dislocation of the astragalus we saw together proved fatal the day after. The symptoms varied little from those you saw. The inflammation gradually increased in the leg and thigh; and had there been excessive suppuration, the inflammation must necessarily have subsided, and the symptoms consequent upon the extensive injury to the joint and soft parts would, in some degree, have been ameliorated, and the patient might have rallied. This case was not inspected.

"Mr. Taylor has favoured me with the following answers to your questions:—He has met with four cases of dislocated astragalus; all of them were forwards, and rather outwards. In the *first case,* there was a partial dislocation of the bone, which he reduced, and kept in apposition during the reparative process. The case went on progressively, without any deep suppuration, or, indeed, any bad symptoms; and the use of the joint was, in a great measure, restored. I presume in this case there must have been a fracture of the fibula, though Mr. Taylor said not. It occurred many years ago. In the *second case,* there was a complete dislocation of the bone, which Mr. T. partially reduced by the aid of a pair of forceps. This case went on favourably, without any bad symptoms, and no suppuration ensued. There was a contraction, of course, leaving the heel permanently three inches from the ground; and, necessarily, a permanent inflexibility of the joint. In the *third case,* there was a compound and complete dislocation of the bone, without any fracture of the fibula. The bone was removed, and the patient gradually got better. In this case the constitutional symptoms ran high, and the inflammation and suppuration were rather extensive, and several collections of matter took place in and above the ankle. The man is able to walk tolerably well, though a certain degree of stiffness remains in the joint; but not so much as you might suppose would result from such a case. This patient came under our care in the spring of this year, and he now resides at Rhodes, near Middleton; his name is Partington. The above three cases were favourable subjects, being strong constitutioned young men. The *fourth* and last case is the one you saw with me.

"In conclusion, I have given you as many particulars of the above cases as I could gather from Mr. Taylor, and remember myself, at present. The two last cases I attended, in some measure, myself. I have misplaced the other astragalus, but will endeavour to find it, and call upon you in the course of a few days. "Yours, very respectfully,

"*December 26th,* 1842." "R. MILNER.

These cases, coming from the source they do, are invaluable, as showing the impracticability of reducing complete *isolated* dislocation of the astragalus, by any experience united with the greatest

degree of force that can be exerted; for it is well known that Mr. Taylor has been able by force, used with unsparing and untiring hands, to accomplish what most surgeons durst not attempt; yet complete and isolated luxation of the astragalus is an accident which defied all his efforts at reduction.

In the two cases of complete dislocation Mr. Taylor excised the bone. The first of these occurred in February, 1841. It happened to a healthy man residing at Rhodes, near Middleton, in this county; and was produced by jumping from a wall, in the dark, on an irregular surface of ground. The patient was immediately removed home, and on the following morning taken to the "Whitworth doctor," who found the astragalus dislocated, without fracture of any of the bones of the leg; attempts were made to reduce the bone, by extension and counter extension, kept up for half-an-hour by seven athletic men, but all to no purpose; upon which, amputation of the limb was recommended. The patient, however, was unwilling to submit to this proposal, therefore was sent to Mr. Taylor, of Oldfield Lane, who also tried reduction, but in vain; and finding this to be the case, the astragalus was excised. The case did well, and on the 1st of January, 1843, the author had an opportunity of seeing the patient, and of witnessing the satisfactory state of his limb, which, although one inch shorter than the opposite, is capable of performing tolerably free motion.

The author was requested, by a friend of the patient, to visit the fourth and last of these cases on the 13th of December, 1842. He found him

as stated in his report. The unexpected occurrence of being called to a case of dislocation of the astragalus, under the care of Mr. Taylor, was most opportune for enabling the author to obtain some information from Mr. T. (who is well known to have very extensive experience in dislocations and fractures,) as to the results of cases of this kind that had come under his observation; he was, therefore, induced to elicit from him, through Mr. Milner, the important information communicated in Mr. M's. letter, and in the detail of cases which came under his notice and treatment.

For the following case the author is indebted to Mr. Smith, of the Leeds Infirmary:—

Case 20.—*Complete, Direct, Simple, and Complicated.*—John Hewick, aged 25, was admitted into the Leeds Infirmary for a supposed dislocation of the ankle joint, with fracture of the fibula.

October 25th, 1825. The bones were reduced in the usual way, and a cataplasm applied. In a short time a large slough formed below the ankle, which separating, it was discovered that the astragalus had been displaced; the articulating surface, by which it was joined to the os naviculare, being turned outwards, and exposed.

November 22nd. The astragalus, having separated, was removed; cataplasm continued.

27th. Wound dressed, and placed in a fracture box. Made out-patient January 13th.

Case 21.—*Complete, Direct, Simple, and Complicated.*—Monsieur Velpeau gives the following case:—

A merchant, while leaping out of his carriage,

fell upon his left foot, and dislocated the astragalus forwards and outwards. There was also a fracture and wound of the integuments at the same time. The astragalus was removed; but an emphysematous tumefaction of the whole limb came on, accompanied with alarming nervous symptoms, and ended in the death of the patient the fourth day after the accident.

Case 22.—*Complete, Indirect, and Simple.*—A man, 47 years of age, a German by birth, and of a healthy constitution, fell down a flight of stairs. The patient immediately felt a severe pain in the left ankle, which, on examination, was found to be deformed, and its motion exceedingly painful. On the next morning he was taken to M. Dupuytren's consultation, and the case is thus reported:—"Foot turned inwards; immediately below the situation of the malleolus internus, (which cannot be felt,) there is a deep depression; external malleolus very prominent; and below, and in front of it, there is another projection, which feels unequal and angular; skin at this part much stretched, severely contused, and slightly excoriated. The foot cannot be moved in any direction; most severe pain when the gentlest attempt is made; swelling not very considerable. The foot appears somewhat shorter than the other, and it is carried a little backwards; no disturbance of the bones of the leg can be detected." The case was immediately pronounced to be one of dislocation of the astragalus, forwards and outwards on the calcaneum. Reduction was attempted, but without success; the limb was, therefore, permanently deformed.

Case 23.—The author has the permission of Mr. Smith, of Leeds, to publish the following :—

James Bracewell, aged 27, a prisoner in the Wakefield House of Correction, was admitted an in-patient, August 3rd, 1830, under Mr. Smith. About three o'clock the previous afternoon, when employed in his usual occupation of treading the wheel, one of the steps being broken, his foot slipped, and was caught by the wheel ; after which he was unable to stand. Mr. Dunn, the surgeon to the prison, after attempting for more than two hours to reduce the bone, failed, and then ordered him to be sent to the Infirmary. He has been unable to rest during the night from pain. The astragalus forms a projecting tumor over that portion of the os calcis which articulates with the os cuboides ; the sole of the foot is turned inwards ; its outer edge, when he stands, rests upon the ground ; two prominences, which appear to be the two external angles of the astragalus, point distinctly under the skin. Reduction was attempted with the pullies, the bandage being fixed on the calf of the leg, the leg being bent to relax the flexor muscles. A silk handkerchief was fixed round the heel and over the instep, and gradual and powerful extension was kept up for near ten minutes, Mr. S. pressing on the prominent part of the bone with his hand, and attempting by these means to reduce the bone, but every effort proved ineffectual. Mr. S. hoped, that by allowing the parts to remain in their present state, the integuments would slough and the displaced bone come away, and that an articulation would be formed

between the os calcis and the tibia, Mr. S. having had three previous cases which terminated successfully in this manner. A large poultice was applied, and the limb ordered to be kept in the bent position. Sol. cath. ℥j. ter. die.

6th. The integuments over the tumour beginning to slough, the patient has had no rest on account of severe pain.

9th. Much easier.

15th. Slough increasing.

September 1st. Slough still increasing; considerable constitutional irritation. The patient has lost flesh, and is become very weak.

11th. Sloughing process ceased. An abscess has formed on the inner side of the foot, discharging pus profusely. The patient shows no improvement in his health. It seems the astragalus has not been sufficiently detached from its connexions to cause its acting as a foreign body in the wound; attempting its removal at present would, probably, be a much more serious remedy than amputation.

22nd. The discharge from the inner side of the foot nearly ceased. Poultices discontinued, and soft dressings applied: much less pain. The patient's health improving.

23rd. Limb ordered to be put in splints, as for fracture, gradual pressure being maintained on the inner side of the foot, with the hopes of bringing it nearer to its natural position.

28th. Being necessary to make a counter opening for the abscess, which continued to suppurate, the splints have been removed, and poultices applied.

October 1st. Another slough has appeared an-

terior to the former; an articulating surface of bone presents, which appears to be that part of the astragalus in connexion with the os schaphoides. Poultices continued.

15th. Granulations springing up from the bone, and the sore healing. Continue poultice.

19th. Surface of bone entirely covered by the granulations, which bleed freely when disturbed by the probe. Discontinue poultice, and apply soft dressings and bandage. Appetite poor; feels weak and languid. R. infus. rosæ c sulph. quininæ ʒj. ter. die.

22d. Sores healing; limb to be put up in splints as before.

November 1st. Foot easy, and sores healing; health gradually improved.

December 1st. Sores quite healed.

20th. The patient not being able to bear any weight on the injured foot, and the bone apparently not at all likely to be cast off, at a consultation with Messrs. Chorley, Hey, and Smith, it was determined to remove it by operation, and to have recourse to amputation as a last resource, should the attempt at its removal fail.

23rd. (*Operation.*) Mr. Smith commenced by making a crucial incision above the projecting portion of the astragalus; and dissected down the flaps on all sides. For the purpose of obtaining a better purchase, an attempt was made to bore a gimblet into the substance of the bone, but its extreme softness prevented this being of any service; on removing the gimblet it bled profusely. The progress of the operation was now considerably

impeded, owing to the strong connexions which had been formed between the astragalus and contiguous bones, it being firmly anchylosed to them. It was with great difficulty that Mr. Smith was enabled, by chisels and levers, to remove the bone from its connexions: this, however, was effected, and the foot was brought into its natural position with ease. On examining the bone it was found to be completely inverted by the accident, for instead of the two projecting points being, as was supposed, the external angles of the bone, they proved to be the *posterior;* that portion which overlaps the posterior articulation with the os calcis internally, and the *anterior projection* formed by the internal edge of that surface which articulates with the os schaphoides. This may appear strange, but it is proved by the situation of the perforation made with the gimblet; for if the bone had not been inverted, how could the perforation be made, during the operation, on the under surface of the bone where it articulates with the calcis? But the fact of the inversion of this bone is further confirmed by one related by Dupuytren in 1819; who on cutting down upon the astragalus, in a case of this kind, found that he could not remove it so readily as he expected, nor could he replace it; and it was not till after a tedious operation that he succeeded in taking it away. The difficulty arose from the upper surface of the bone being turned downwards, and what was naturally the lower part of it took hold of the tibia in the manner of a fork. (*Annuaire Medico-Chirurgical des Hopitaux de Paris,* 1819, p. 28.) The bleeding was trifling, no vessels being

tied. The flaps of the wound were brought together and secured by adhesive plaster, over which, soft dressings and a wet calico bandage were applied.

25th. The dressings were removed this morning, wound tolerably healthy, though no adhesions have taken place, and the lips looks livid and flabby. Discontinue dressings; applied cataplasm lini.

January 4th, 1831. Healthy granulations, and wound rapidly healing; discontinue poultice, apply soft dressings, and bandage in such a manner as to keep the foot, as much as possible, in its natural position.

9th. Chasm entirely filled up; the granulations having risen above the edges. The wound to be dressed with lint and strips of adhesive plaister.

18th. Sore continues to heal, can now bear considerable pressure on the foot, but the mere application of the bandage is not sufficient to bring it to the natural position; a shoe is to be worn, hollowed out opposite the wound, and straps fixed from the knee to the outside of the toe and heel, to keep up a more effectual pressure outwards than can be done by bandage alone. Health has conderably improved since the operation; is allowed to get up during the day, but from the contraction of the muscles, owing to the limb being so long in the bent position, he cannot put his foot to the ground. The linim terebinth to be applied twice a day to the contracted parts.

February 12th. Foot nearly brought to its natural position, and admits of slight motion at the ankle joint; the man has almost regained the complete use of his knee. A boot, with a double sole,

ordered so that with its assistance he will be able to walk very comfortably.

18th. The ankle of the injured foot is about an inch nearer the ground than the other. The high-heeled boot answers very well. Discharged cured.

December 7th, 1831. Mr. S. received a letter from the patient, in which he says, "My leg is a great deal better; it is sufficiently strong that I can walk about home with the help of my stick." The man would have come over to Mr. S. to see him, but was afraid of being again sent to the House of Correction.

Since this account was written, Mr. Smith paid the patient's coach hire from Barnsley to Leeds, in order to have an opportunity to take a cast of the leg: he could then walk with a slight limp, and there was very tolerable motion in the joint.

The author has given this case in full, as it is a very instructive one, and shows the difficulties with which we have to contend, and the line of practice to be pursued, in dislocations with altered axis of the bone. Mr. Smith has obligingly sent the author the extracted astragalus, and casts of Bracewell's foot, before and after the operation.

The author is indebted to Mr. Gaskell, of Lancaster, for the particulars of the following case, which occurred at the Manchester Royal Infirmary, during the house surgeoncy of Mr. Golland:—

Case 24.—*Complete, Indirect, Compound, and Complicated.*—Mr. Gaskell writes:—"The most important case which has come under my observation is one of compound dislocation of the astragalus, in which the bone was removed by Mr. Golland,

and the patient recovered the use of the limb. I have no note of the manner in which this accident occurred. The wound of the integuments was considerable, extending across the anterior and outer side of the ankle; the external malleolus was broken off the shaft of the fibula; the astragalus was split into two portions, the external and smaller portion had escaped, and the other piece remained between the tibia and os calcis; but although still remaining in the socket, it was displaced from its original position, and the connections with the os calcis, &c., were broken. This portion was removed, as well as the external malleolus; the edges of the wound carefully brought together, and the limb placed in a splint. No untoward symptoms arose, and in four or five months he was able to walk tolerably well.

Mr. Banner has kindly sent an account of an interesting case which occurred in his practice:—

Case 25.—*Complete, Indirect, Compound, and Complicated.*—W. J., aged 63, was admitted into the Liverpool Northern Hospital, with compound dislocation of the astragalus of the right leg, and compound fracture of the fibula. The patient had led a very irregular life, *having been a hard drinker*, and his general appearance indicated an intemperate man: his employment is that of a labourer about the docks, and at the time of his admission he was under the influence of drink. He had fallen into the hold of a vessel, but could not give any distinct account of the accident, but thought he had alighted on his feet and then fell; and at the bottom of the ship's hold were several small boxes

bound with iron, with which he came in contact. There was a small angular wound about one and a half inch above the external malleolus, as also another in front of the external malleolus extending three inches from its point towards the front of the foot; through this latter wound, which is uneven and lacerated, the astragalus has been forced, and is resting over the mouth of the wound in front of the external malleolus, and which is only just large enough to admit of its exit. The only connexion the astragalus has with the foot is through the tibio-tarsal ligament; and so forcibly has it been driven from its situation that the upper surface of the bone (or that on which the tibia rests) is turned inwards, and the surface which was connected to the calcis has become most external, so that it presents the following appearance:—The inferior portion of the bone lies in front of the wound, showing its two articulating surfaces for the os calcis with the deep groove, from which the interosseous ligament has been torn; the larger and deeper articulating surface is nearly in front of the external malleolus, whilst the smaller one is still more in front of the bend of the foot, the deep groove being in the longitudinal direction; the articulating surface of the navicular bone is pointing across the foot towards the great toe, thus the surface for the end of the tibia is turned inwards, and held only by the tibio-tarsal ligament. The bone is easily raised, and exposes the wound through which it has passed. There is a compound fracture of the fibula immediately opposite the upper wound. In consequence of the patient's age and previous intemperate habits,

and in consideration of his occupation, we determined to amputate the limb. The man left the hospital in seven weeks quite well.

IV. DISLOCATIONS UPWARDS AND OUTWARDS.

Case 26.—*Complete and Compound.*—A highly interesting and instructive case, and the only one of this kind on record, is given in the 2nd volume of the *London Medical Gazette,* extracted from the case book of Dr. Wells, of Columbia :—

Dr. G. W. S., aged 30 years, of an active constitution and sanguineo-nervous temperament, was, in the early part of his convalescence from fever, taking a short ride in an open carriage, when his horses became frightened and ran off. In attempting imprudently to extricate himself, by leaping from the vehicle, he struck upon his left foot, and dislocated the os astragalus from its junction with the schaphoides upwards and slightly outwards.

Several medical gentlemen of the vicinity were called to his assistance, who made violent efforts to reduce the bone, but without effect. This was followed by fever, swelling, inflammation of the joint, and ulceration of the soft part, so as to expose the astragalus, which shortly afterwards became carious. This accident confined him to his room several months longer. He came to Columbia, (a distance of 150 miles,) in six months after the injury of his ankle, when he had but imperfectly recovered his general health. The ankle was considerably swollen, occasionally painful, and admitted of little or no motion; the foot was

turned inward, and was partially extended. A circular ulcer, about three-fourths of an inch in diameter, exposed the head of the astragalus in a carious state. He walked on crutches, and could bear very little weight on the lame foot. Towards the close of the seventh month, having taken much more exercise than usual, he was attacked with violent inflammation throughout the tarsus, accompanied with great swelling, excruciating pain in the part, and high fever.

Bleeding, general and local, and the most rigid antiphlogistic course, were followed up for several days, notwithstanding which an extensive suppuration took place, and the matter was discharged by punctures with the lancet on both sides of the joint. On examination with the probe it was ascertained that the astragalus had become carious at different parts.

It was now a question whether the leg should be amputated or the diseased bone removed, one or the other of these operations being deemed necessary to save life; and as there did not appear to be any other bone besides the astragalus affected, the latter was determined upon, and done on the 18th of August, in the presence of several medical gentlemen.

An incision was made, commencing at the edge of the original ulcer, near the tendon of the common extensor of the toes, and carried obliquely backward and downward, a little past the lower head of the fibula, and the astragalus was carefully detached from its connexions. There was very little difficulty in the operation, no vessel divided

requiring the ligature, consequently very little blood was lost.

The astragalus, when extracted, left a frightful wound, the foot seeming to be nearly separated from the leg.

A hollow splint was adjusted to the inside of the foot and leg, so as to preserve the limb perfectly steady and in a proper position, the foot being kept at a right angle with the leg. Simple dressings were applied to the wound, and an anodyne administered.

At the end of September the wound was healed, and the swelling of the parts had subsided. Twelve months after the operation this gentleman walked without the least difficulty, and the ankle was perfectly sound. The leg was shortened about an inch, and the deficiency supplied by a thick heel upon the shoe.

V. DISLOCATIONS INWARDS.

Case 27.—*Complete, Direct, and Compound.*—It is recorded that Monsieur Ferrand, surgeon to the Hotel Dieu de Paris, had extracted, with success, the astragalus, which was dislocated in an officer, and who was in the habit of carrying the bone in his pocket, and showing it as a proof of the severe injury he had received.

Case 28.—Monsieur Lacemonier communicated to the *Societé Royale de Médècine* a case of dislocation of the astragalus, which occurred in August, 1790, caused by a violent twist of the foot, which produced a complete compound dislocation of that bone from the tibia, fibula, calcaneum, and os

naviculare, inwards, below the malleolus internus, and between the tendons of the tibialis posticus and long flexor of the great toe, which had been partially lacerated, and was in a state of gangrene.

The astragalus was of a black colour, and the wound discharging a fœtid sero-purulent matter. The leg and foot were much swollen, and the patient laboured under slow fever. Considering the astragalus as a foreign body, M. Lacemonier thought it proper to extract it, which operation was followed by considerable amelioration of symptoms. Matter, however, subsequently formed about the outer ankle and above the foot, requiring counter openings; but from this time the patient continued to improve, and in fine had a useful foot, notwithstanding the loss of the astragalus and of the tendons of the peroneus longus and flexor longus pollicis muscles.

Case 29.—*Complete, Direct, Compound, and Complicated.*—Mr. Bransby Cooper has related an interesting case, under his care, of most extensive fracture of the lower ends of the tibia and fibula, with compound dislocation of the astragalus inwards. The accident occurred to Mr. ——, near Aylesbury; and Mr. Ceeley, an eminent practitioner of that town, reduced the dislocation, applied a long splint along the outer side of the limb, and, in conformity with the patient's desire, brought him up to town to his own residence. When Mr. Cooper and Mr. Ceeley examined the limb together, on the patient's arrival at his own house, a part of the astragalus was still projecting through the wound, and confined a portion of skin so tightly under it, that Mr. C.

considered it advisable to remove the piece of bone. By this means the skin was immediately liberated, and the foot readily placed in its natural position. The case was proceeding favourably up to the time of its being published in the second edition of the late Sir A. Cooper's valuable work, edited by Mr. Bransby Cooper.

Case 30.—*Complete, Direct, Compound, and Complicated.*—In the *New York Hospital Report* for 1827 there is a case given by Dr. Stephens of dislocation inwards :—

A stout lad fell from a height of 50 feet, and received a compound luxation of the astragalus inwards. He was immediately conveyed to the Hospital above-mentioned, and put under the care of Dr. Stevens, who endeavoured to reduce the bone to its proper place; but, failing in this, he tried to pull out the bone, which was also impracticable. Extension was made; and as the bone could not be reduced to its proper site, it was extracted, by dividing the ligaments that held it, with the scalpel, though not without considerable suffering to the patient. Upon minute examination of the bone, the processes to which the ligamentum inter fibulam et astragalum posterius, and ligamentum fibulæ anterius are attached, were found broken off. The limb was laid flexed on its outer side on a splint and pillow, and the wound dressed with lint and roller. We need not detail the after treatment, which appears to have been judicious. There was ultimately some flexibility of the ankle joint, with little deficiency in the length of the limb.

Case 31.—*Complete, Indirect, Compound, and Complicated.*—Mr. Sawyer has published, in the

first volume of the *Gazette*, a case of dislocation of the astragalus inwards, accompanied with fracture of the tibia and fibula:—

William Wright, aged 42, of a thin, spare, and bad habit of body, sallow complexion, lax fibre, &c., when thatching a corn stack in September, 1825, fell from a height of 40 feet, perpendicularly, and his left leg and foot sustained the injury. He was immediately conveyed home, a distance of nearly two miles, when Mr. Sawyer saw him. Upon examination of the parts injured, the malleolus internus was found fractured obliquely, the fibula was also fractured a little above the joint, and the astragalus was situated at the inner part of the foot, below the internal malleolus, wedged between it and the os naviculare, forming a prominent projection under the skin, and turned upside down, so that there was a complete luxation of the astragalus, with fracture of the lower ends of the tibia and fibula. The usual means of reducing the astragalus were adopted, without effect. The part was much swollen, with great extravasation Inflammation took place, extending to the thigh, and was so severe as to threaten gangrene. In a few days sloughing took place, with a great discharge of pus, exposing the surface of the astragalus. This bone becoming loose, it was taken out with the forceps. The removal of it occasioned a little hæmorrhage. The granulations which had formed at the side of the wound were slightly scarified, and pressed downwards, which assisted materially in filling up the gap. Adhesion immediately took place, and the granulations at first grew rapidly. Afterwards, however, they became weak, and it was, therefore, some time before

the external wound completely healed; no exfoliation whatever took place. On examining the astragalus, the articulating surfaces of the under part were found to have been broken off, as well as the navicular process of the anterior and posterior convex surfaces of the fossa. It is, therefore, more than probable (and the strength of joint led Mr. Sawyer to believe) that ossification must have taken place to some extent, connecting the under surface of the astragalus with the navicular process, making up the deficiency caused by the loss of the upper part of the bone. The man has a little flexion of the ankle, can walk without the aid of a stick, and had worked at country work above a year when the case was published. The leg is the same length as the other.

I am indebted to Mr. Wickham, surgeon to the Winchester Infirmary, for having my attention directed to the following case, related by Mr. Burnett, but in which Mr. Wickham was consulted. It has been published in the 19th volume of the *Medical Gazette*:—

Case 32.—Colonel G., an active man, of a spare habit of body, and upwards of 60 years of age, was fox-hunting on the 23rd of February, and had made a leap, when suddenly he found himself unable to follow, in consequence of his right foot being displaced; his usual habit was to ride in his stirrup, the foot resting on its outer side. When Mr. Burnett first saw him, the boot had been removed, which, from the force of the injury, had given way, the bones protruding through it. The foot was dislocated inwards, at right angles with the leg; and two bones were plainly to be seen pro-

jecting out of a wound, which was about three inches in length, extending across the outer ankle. Mr. B. carefully examined the situation and shape of these bones: the upper one, the os naviculare, had projected its cuneiform surface outwards and inwards in an oblique direction; and the other bone was the astragalus, which had forsaken its natural cavity, was driven forwards and outwards, and presenting that surface which in its natural position would be in contact with the os calcis Mr. B. steadily kept pressure as firmly as he could for nearly a quarter of an hour upon the prominent os naviculare, in the direction of the joint, to which he was directed by the end of the tibia, which was plainly to be seen beneath the astragalus At the expiration of this time he had the satisfaction to see the bones slip into their proper places, and the foot resume its natural character The end of the fibula was not fractured. Having placed the limb in proper splints, Mr. Burnett conducted the patient home, where he was met by his family surgeon, Mr. Wickham, of Winchester, in whose able hands Mr. B. had every satisfaction of knowing it would be watched with an active and intelligent eye. The case has done remarkably well, and in a letter which Mr. B. received from Mr. Wickham, he is told, "I am able to inform you that Colonel G.'s case has been brought to the most satisfactory termination. The wound is healed, the motion of the joint is perfect, and the swelling of the part is nearly reduced. Weakness, which time only can remove, and the occasional puffiness from use, are the only remaining effects of the injury. You are aware that the progress of the case has scarcely been

interrupted, and that inflammatory symptoms only once occurred during the period of his confinement; these were ushered in by a rigor and succeeding heat; they occurred about three weeks after the accident, and only lasted a few hours At present he is able to walk with crutches without the least inconvenience, and the limb supports, occasionally, its share of the weight of the body. As to the motion of the joint, it can not only be performed by myself, but the patient can freely bend and extend the foot."

Appended to the relation of this case are some useful reflections on the nature of this very severe accident. Much credit is due to Mr. Burnett for his management of the case, which is to be regarded as one of dislocation of the astragalus and os naviculare, whence more easily reduced than isolated luxation of the astragalus is proved to be.

VI. DISLOCATIONS OUTWARDS.

Case 33.—*Complete, Direct, and Compound.*—Amongst other interesting cases given by Baron Boyer is mentioned one of compound dislocation of the astragalus outwards. The surgeon in this case, in spite of the opinion of his two colleagues, who were favourable to amputation of the limb, decided on excising the bone at the eighth day after the accident occurred, and in about fourteen weeks the patient was able to walk with the assistance of a crutch.

Case 34.—*Complete, Direct, and Compound.*—Monsieur Mauduyt communicated a case to the *Societè Royale de Médécine,* of a military man, of the age of 30, who was severely wounded in the

foot, in consequence of leaping from the top of a wall. The shock was considerable, and caused a compound dislocation of the astragalus outwards. The surgeon who was called to the patient, believing that it was not possible to reduce the bone, detached it, by dividing the ligaments and other structures by which it was held. The cure was lengthened and difficult; but after about 18 months the patient could walk slowly by means of a cane.

Case 35.—*Complete, Direct, and Compound.*—A case is recorded in Mr. B. Cooper's edition, of a Mr. Miles, who met with compound dislocation of the astragalus outwards, without fracture of the fibula or tibia. Here the reduction could not be accomplished; and Mr. Callaway, in consultation with Sir A. Cooper, decided on the removal of the astragalus, which was done by Mr. C. This case was followed by great constitutional irritation, of which the patient died on the 11th day. On examining the limb after death, a large abscess was found underneath the metatarsal bones, and a prodigious quantity of matter had burrowed up the leg under the gastrocnemii, nearly as far as the knee.

Case 36.—A very similar case to that of Mr Callaway's occurred at the Hopital St. Louis, Paris, under the care of Monsieur Richerand. A man, aged 46, met with the accident of compound dislocation of the astragalus outwards, the bone resting on the upper part of the cuboid bone. The medical attendants immediately tried to reduce the bone, but unsuccessfully. On the following morning, M. Richerand again attempted reduction, but his endeavours were equally ineffectual: therefore extirpation of the bone was decided upon and immediately

performed. The case went on well whilst in the hospital, but the patient's wife was anxious for his removal home, which was granted, and it was reported that the patient died eight days after his discharge from under Monsieur Richerand's care.

Case 37.—*Complete, Direct, Simple, and Complicated.*—Sir A. Cooper mentions a case of dislocation outward. Being sent for into the country to visit a patient, the surgeon, Mr. James, of Croydon, whom Sir A. Cooper met there, requested him to see a gentleman who had a dislocation of the foot, which had happened several weeks before, but had not proceeded to Mr. James's satisfaction. Upon examination, Sir A. Cooper found the astragalus dislocated outwards, and the tibia broken obliquely at the inner malleolus; every attempt at reduction was made which Mr. James, who is an extremely well-informed man, could adopt; five persons kept up a continued extension when the accident first happened, but without effect; the patient was taken home, and several persons were employed in extending the foot, and it was thought, after a time, with some success; but the reduction could not, by all their efforts, be rendered complete, as the astragalus still remained upon the upper and outer part of the foot. The extension could not be carried further; the integuments sloughed from that which had been already made, and the wound was a long time in healing. The limb now deviates much from its natural shape; the toes are turned inwards and pointed downwards; there is some little motion at the ankle, and only a slight degree of it between the projecting and raised astragalus and the other bones of the tarsus.

The following case of dislocated astragalus is furnished by Mr. Smith, of Leeds:—

Case 38.—*Complete, Indirect, and Simple.*—September 3rd, 1821. During my absence a few days in the country, James Fawcett, aged 66, was admitted into the Leeds Infirmary. He had been driving his cart quietly on the road, when two or three young men, who were also driving carts, whipped their horses into a gallop in order to pass him, when he was thrown out, and one of the carts passed over his ankle. There was a considerable degree of swelling of the limb, and the case was supposed to be a fractured fibula. A poultice was applied and the limb placed in a bent position. Mr. Smith saw the limb on the 7th, when there was a projecting part of the bone in the situation of the head of the fibula, and a little lower another portion of bone; these were covered by the common integuments much upon the stretch; the bones were firm and immoveable, and it was evident that the covering of integuments would slough away shortly. At this period I looked upon the case as being one of fractured fibula, and the inferior projecting point of the bone I suspected to be the os cuboides forced from its proper situation.

September 15th. The integuments had sloughed and the two points of bone were projecting, but a small slip of integument had remained, dividing them into two; this had sloughed also, and it was now distinctly seen that these two points which projected were portions of the same bone. Mr. Smith immediately suspected it to be the astragalus which was dislocated; and upon comparing it with one of these bones, the upper portion was found

to be the outer surface of the bone which articulates with the tibia, and the lower portion was found to be the head of the astragalus which articulates with the scaphoid bone.

September 18th. The patient complains of pain in the head and shoulders ; bowels constipated.

19th. The bowels have been freely moved, and he has experienced great relief.

21st. The circumference of the wound rather increased.

October 6th. Mr. Smith proposed to his colleagues the removal of the dislocated bone, which was immediately assented to, and the man was taken into the operation room. Mr. S. anticipated great difficulty in removing the bone, but was agreeably surprised to find that after passing the scalpel round to detach it from the integuments, it was removed by a single push of a sharp chisel ; a very deep chasm was exposed, which bled very freely, but ceased immediately after removing the tourniquet. The sides of the cavity were covered with dressings of lint and ung. ceræ, and a poultice over all.

7th. The patient has passed a good night, and the wound looks healthy.

10th. Continues to go on well; the poultice to be discontinued.

27th. The cavity is much diminished, but there is a slight inflammation.

30th. Much better.

November 27th. Was ordered to walk about the ward a little.

20th. The wound is nearly healed; he has a slight motion in the joint : was made out-patient.

December 4th. He came to the Infirmary in a

cart, got wet, and was shook a good deal in returning home.

17th. Mr. Greenwood was sent for to Hunslett to see him. He had been taken ill in consequence of exposure to wet and cold in returning from the Infirmary; an abscess had formed in the inner ankle, which Mr. G. opened. The original wound had a foul appearance, and a thin sanious fetid discharge flowed from it; a poultice was ordered, and he was again made an in-patient. At this period an erysipelatous inflammation pervaded the whole limb, and a probe, passed in at the opening made at the inner ankle, came out at the original wound at the outer ankle.

December 23rd. He is much better; wounds now look healthy and are nearly healed; swelling much abated. He was again made an out-patient, and has since continued to improve gradually; he can walk tolerably without the assistance of a stick, but he still uses a crutch and stick. There is a very fair motion of the tibia upon the os calcis, and he thinks the limb is about half an inch shorter.

VII. DISLOCATIONS BACKWARDS.

In the 14th volume of the *Medical Gazette* there are given two interesting cases of this accident by Mr. Phillips:—

Case 39.—*Complete, Direct and Simple.*—A gentleman (Mr. G.), aged about 35, was driving himself and two ladies in a phæton, when the horse became unmanageable, and the reins broke. Mr. G. threw himself from the carriage, with the hope of succeeding in stopping the horse, and alighted upon

his feet, but immediately fell forward to the ground. He was brought home, and in about two hours from the occurrence of the accident Mr. P. was requested, by the patient's medical attendant to consult with him on the case.

The kind of injury which had occurred was immediately apparent, by the projection which was presented just above the os calcis, and the absence of any other very apparent change in the relative position of the other bones.

The tendo achillis was pressed backwards by the displaced astragalus, so as to describe an angle of about 40 degrees; and at one point it had reached so near the surface, that vesication of the skin was produced directly over it. Upon careful examination there could be no doubt about the nature of the accident. That the projection of the tendo achillis was produced by the astragalus was quite certain, for there was no fracture of the tibia or the fibula. The tibia was slightly displaced forwards upon the foot, and the os calcis retained its natural position.

Before the reduction was attempted, the patient was bled to twenty ounces, and nauseated by tartar emetic, the effect of which was maintained for an hour, during which time the efforts to reduce the bone were uniformly sustained.

The point to which the endeavours were directed was first, to produce the greatest possible quantity of flexion of the foot upon the leg; at the same time, by means of pullies, removing those organs as far as possible the one from the other, and, by means of pressure upon the astragalus, endeavouring to restore it to its natural situation.

These efforts were unsuccessful, and therefore only one of two modes of proceeding remained for selection, viz., to leave things in their then state, merely combating any untoward symptoms which might be developed, or to extract the astragalus. Mr. Phillips having in his recollection, among others, a case which occurred in the practice of Dupuytren, in which the astragalus was displaced forwards, and the long and painful operation which occurred in extracting it, the long convalescence which followed, and the permanent lameness which was the consequence, declined to accede to this proposition. Leeches in large numbers were applied to the seat of the injury, the bowels were carefully regulated, and no bad symptoms occurred; an artificial articulation was formed between the bones of the leg and the os calcis; little inconvenience was occasioned by the astragalus, and when Mr. P. last heard of the patient he walked nearly upright.

Case 40.—*Complete, Direct, and Simple.*—The second case upon which Mr. Phillips was consulted was in a gentleman, aged 32, who was occupied in playing cricket; and while fielding and running very rapidly after the ball, his foot became fixed in a gutter, which was in his course, and unobserved. The toe rested upon the further side of this gutter, while the heel was jammed directly into it, which caused the patient to fall forwards. It was found, on raising him, that he was unable to rest upon the injured leg, and it was evident to the bystanders that a displacement had occurred. Mr. Phillips was not summoned till the following day, before which time some inconsiderable attempts at

reduction had been made. The leg presented an appearance very similar to that which Mr. P. has described in the former case, except that there was more ecchymosis about the external malleolus. The patient was bled to sixteen ounces, and twenty leeches had been applied to the injured part. In this case there was, when Mr. P. saw it, considerable tumefaction; he declined, therefore, to make any further attempts at reduction, or to have recourse to a removal of the displaced bone.

This accident occurred in August. The first week in November the patient was able, with the aid of a stick, to walk a short distance; and on the first of January scarcely any lameness remained. Considerable extent of motion was produced in the new articulation, and the only inconvenience of which the patient complains is the necessity which has been imposed upon him of wearing a shoe, the hinder leather of which shall not reach so far as to come in contact with the projecting astragalus.

There are appended to these cases some valuable physiological and practical remarks on newly-formed joints in unreduced luxations, and on the difficulties which are met with in reducing dislocations of the astragalus.

Case 41.—*Complete, Direct, and Simple.*—Mr. Lizarz mentions a case in his useful and well-illustrated work on surgery, where the astragalus was driven backwards behind the tibia, between it and the os calcis, in which all attempts at reduction were unavailing; but the case did well, and a useful limb remained.

Case 42.—*Complete, Direct, and Simple.*—Baron Boyer gives a case of this accident, the history of

which illustrates the fact that dislocation backwards, owing to the space being so considerable between the posterior part of the tibia and tendo achillis, may be overlooked, a mistake scarcely likely to happen in dislocation in any other direction. A young man fell from a height and pitched on his feet, but more particularly on the right foot. The surgeon who was called to the patient treated the case as a violent sprain.

Baron Boyer saw the case a month after the accident, and discovered it to be dislocation backwards. No attempt was made at reduction, and the patient recovered with anchylosis.

Case 43.—*Complete, Indirect, and Simple.*—Mr. Liston met with an instance of displacement of the astragalus backwards. A heavy young man, in a state of utter intoxication, fell backwards down a stair, and in the fall the foot became entangled in the railing. The astragalus was found lying betwixt the back of the tibia and the tendo achillis; its upper articulating surface facing forwards, the lower in contact with the tendon. All attempts to reduce the bone proved fruitless; violent inflammatory action followed, but was reduced by active measures, and the limb ultimately became very useful; in fact, though not till after many months, little lameness or shortening was perceptible.

Case 44.—*Complete, Indirect, Simple, and Complicated.*—The only instance on record where this dislocation was reduced is given in the *Lancet* for July 6, 1839, where a case is reported which occurred at University College Hospital, of dislocation backwards, conjoined with fracture of the fibula.

J. S., aged 22, was admitted June 22nd. He

states, that whilst getting out of a carriage his foot slipped between the step and the wheel; and as the vehicle was going on at the same time, the spokes of the wheel struck the foot against the step and produced the accident. The foot was but slightly displaced, though a little swelled; an imperfect motion existed in the ankle joint; a hard tumour was felt between the tendo achillis and the inner malleolus, which was also fractured, and the irregularity of the broken surface of the lower fragment could be felt under the skin. A hollow, in which the finger could be passed as far as the first joint, existed below and in front of the outer malleolus. The great toe was flexed, and could not be extended by any moderate degree of force. The leg was placed on the thigh, and the foot on the leg; extension was then made from the heel and instep, and counter-extension from the leg, the foot being at the same time turned inwards, when pressure was made to force the hard substance on the tendo achillis forwards. The pressure being kept up for ten minutes, the tumour was felt to disappear, and a snap was heard. All the deformity of the foot, except the slight swelling, had disappeared. The limb was then placed upon one of Mr. Liston's splints, with the foot bent inwards as much as possible.

July 1st. Doing very well.

VIII. DISLOCATION OUTWARDS, DOWNWARDS, AND BACKWARDS.

Case 45.—*Complete, Indirect, and Compound.*—The author cannot find on record any case of this

form of dislocation; he, therefore, presumes that the one which he is about to detail is without a parallel:—

Charles Butterworth, aged 32, a stout healthy-looking man, was brought to the Manchester Infirmary on the 11th of February, 1841, in consequence of a wound of the foot. It so happened that the author was at the Infirmary when the patient was brought in; he, therefore, proceeded at once to inquire into the nature of the case. The patient was an engineer on the Manchester and Leeds Railway line; and whilst at work, the fly-wheel of the engine caught his knee, and as the foot was fixed against the bed plate, the leg, it was supposed, was turned violently inwards, whilst the foot was pushed in the opposite direction, which caused the astragalus to be dislocated, and the bone to appear through the skin and stocking of the left foot. On minute examination, we discovered an oblique wound, about one and a-half inch in length, on the outer side, and behind the malleolus externus, from which the astragalus (tilted round so as to present its tibio-fibular articulating surface to the wound) was protruded. The dislocation was outwards, downwards, and backwards; and singular to remark, the tibia and fibula had escaped fracture. The most persevering attempts were made in the presence, and with the assistance, of my colleagues (Mr. Thorpe, Mr. Wilson, and Mr. Jordan) to reduce the bone, but they were quite unavailing; it was, therefore, decided upon, in consultation, that the author should dissect out the astragalus, which he did without very much difficulty. The

wound was dressed, and the patient carried to bed, where the limb was put up in appropriate apparatus, with foot-board, &c.

It is not necessary to detail the daily reports of this case; it will be sufficient to say, that the patient had a good deal of constitutional irritation; that extensive collections of matter formed about the foot and leg, owing to an attack of phlegmono-erysipelatous inflammation; but although the progress of the case was slow, yet the patient began steadily to improve, so that on the 23rd of June it was reported that the patient's general health continued good, that the wounds in the limb were nearly healed, that there was but little swelling, and that the patient could stand and walk.

The patient remained under treatment at the Infirmary about seven months. After his discharge two small spiculæ of bone exfoliated, since which he has been perfectly well, and has resumed his employment as engineer at the Manchester and Leeds Railway, where the accident occurred.

To the attention which was paid to this case by Mr. Furnival, the house surgeon, and Mr. Smith, it is impossible to award too much credit; indeed, the author does not hesitate to say, that its successful issue was much promoted by the care which they gave to its after management.

These are all the cases of dislocation of the astragalus which the author has, after much labour, been able to collect; a summary of which, in the form of a table, may be useful, for the purpose of comparing the relative frequency of the various forms, courses, and kinds of dislocation, in the different regions of the foot.

TABLE I.

DISLOCATIONS OF THE ASTRAGALUS.

Form, Course, and Kind of Dislocation.	*Forwards.*	*Forwards and Inwards.*	*Forwards and Outwards.*	*Upwards and Outwards.*	*Inwards.*	*Outwards.*	*Backwards.*	*Outwards, Downwards, and Backwards.*	*Total.*
Partial, Direct, and Simple Dislocations	Case 1.	.....	Case 16.	.....	.....	.....	.....	.....	2
Partial, Direct, and Compound Dislocations	2, 3.	.....	.....	.....	.....	.....	.....	.....	2
Partial, Direct, Simple, and Complicated	4. Frac. of tibia and fibula.	....	.....	.....	.....	.....	.....	.....	1
Complete, Direct, & Simple Dislocations	Case 5, 6.	Case 12, 13.	.....	.....	.....	.....	Case 39, 40, 41, 42.	.....	8
Complete, Direct, & Compound Dislocations	7, 8.	....	Case 17, 18, 19.	Case 26.	Case 27, 28.	Case 33, 34, 35, 36.	.....	.....	12
Complete, Direct, Simple, and Complicated	9. Frac. of tibia and fib. Case 10. Frac. of fibula. Case 11. Frac. of os calcis.	Case 14. Frac. of fibula.	Case 20. Frac. of fibula Case 21.	.....	.....	Case 37. Frac. of tibia.	.....	.....	7
Complete, Direct, Compound, and Complicated	.....	.....	....	.....	Case 29. Frac. of tibia & fib. Case 30.	.....	.....	.....	2
Complete, Indirect, & Simple Dislocations	.....	Case 15.	Case 22, 23.	.....	.....	Case 38.	Case 43.	.....	5
Complete, Indirect, & Compound Dislocations	.....	.....	.....	.....	.....	.....	.....	Case 45.	1
Complete, Indirect, Simple, and Complicated	.....	.....	.....	.....	....	.....	Case 44. Frac. of tibia.	.....	1
Complete, Indirect, Compound, and Complicated	.....	.....	Case 24. Frac. of fibula and astragalus. Case 25. Comp frac. of fibula.	.....	Case 31. Frac. of tibia & fib. Case 32. Comp. dislocation of the ankle.	.....	....	.....	4
Total in each Region ...	11	4	10	1	6	6	6	1	45

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REMARKS ON TABLE I.

The transverse lines in this table show the total number of each form, course, and kind ; and the vertical denote the number of luxations in each region of the foot. It will be observed that there are—

OF SIMPLE CASES:

Partial	3	Without fracture	2	3
		With fracture	1	
Complete	21	Without fracture	13	21
		With fracture	8	

OF COMPOUND CASES:

Partial	2	Without fracture	2	2
		With fracture	0	
Complete	19	Without fracture	13	19
		With fracture	5	
		With dislocation of the ankle	1	

Thus, there is no great disparity in numbers between the simple and compound cases.

In a former part of this paper, the author alluded to a statement of Sir Astley Cooper, in reference to the number of simple exceeding that of compound cases of dislocation of the astragalus; in which opinion the author was then fully disposed to coincide; but having been favoured, since that announcement was sent to press, with many fresh cases, which have swelled the list of compound luxations, the proportion of simple is so much diminished as to lead him to doubt the accuracy of Sir Astley Cooper's statement. With a view to correct statistics, the author has made diligent search for published as well as unpublished cases, and he now feels warranted in asserting that the number he has been able to bring together is sufficient to justify the inference that the proportion of compound to simple examples of luxation of the astragalus is barely, if at all, in favour of the latter.

In the table it will be seen that dislocations on the anterior aspect of the foot are more numerous than all the rest put together; there being 25 on the anterior, six on the inner, seven on the outer, and seven on the posterior region of the foot.

In addition to those on the dorsal aspect which have been given, the author has received accounts of others which have occurred in the practice of his colleagues at the Manchester Royal Infirmary. Since the former part of this paper was sent to press, Mr. Thorpe has communicated a case of partial and irreducible luxation forwards, in which Mr. Ainsworth, himself, and Mr. Jordan, were consulted. The bone projected a good deal, but did not materially interrupt the movements of the foot. As this case had been of some standing, there was nothing to justify renewed attempts at reduction; and it would have been hazarding too much to have excised the prominent portion of the bone; the consultants, therefore, thought it the most prudent course not to interfere.

Since the cases have been printed, the author has met with a very interesting instance of luxation forwards and inwards, which occurred at the Middlesex Hospital, under the care of Mr. Arnott and Mr. Shaw, where the bone was extracted with complete success.

Within the last few days, Mr. Smith, of Leeds, has favoured the author with another case of compound dislocation forwards, in which the bone was nearly detached from all its connexions, together with an extensive lacerated wound of the calf of the leg, which, with other injuries about the ankle, induced Mr. Smith to amputate the limb, and the patient recovered. Mr. S. has kindly sent the

author the foot for examination, the appearances of which are as follow:—The astragalus is luxated forwards and slightly outwards, the bias outwards being probably consecutive from the forcible inversion of the foot. The tibial articular surface presents itself forwards and upwards, and the facets for the malleolar processes of the tibia and fibula are fully exposed. The integuments are freely lacerated in front, but the outer inferior malleolar edge of the bone is tensely girt by them and the subjacent textures. It is evident that the bone is completely detached from the tibia, fibula, and calcaneum, but not from the os naviculare; and but for this circumstance, and the integuments giving way, it is very probable that the astragalus would have had its axis completely reversed from its natural position. It is obvious that there is a greater tendency to an ejection of the astragalus from its connexions with the tibia, fibula, and the tarsal bones, outwards, than either inwards or backwards. The dislocations forwards and outwards are more numerous than those forwards and inwards; and those directly, or having a bias outwards, are more frequent than those directly, or having a bias inwards. There are, perhaps, reasons of an anatomical nature for this difference. The fibula is tied very firmly to the astragalus, as well as to the os calcis, by the external lateral ligaments; and so tenacious is the insertion of the anterior and posterior fibular ligaments into the astragalus, that in some of the removed astragali the author has found the bone broken at the point of attachment of these ligaments; the same thing was noticed in Dr. Stevens's and in Mr. Sawyer's cases; and it is probable, that the portion

of the astragalus which remained in the joint, lived and granulated, and caused the limb, in both cases, not to be so much shortened, as it usually is when the astragalus is wholly disengaged from the joint. In the case in which the author excised the astragalus, a small portion of the bone was broken off, and it is probable that some small spiculæ, which exfoliated in the progress of cure, were fragments of the broken astragalus. Dislocations outwards would not be so frequent (owing to the strength of the ligaments), if the position of the tibia with respect to the astragalus were not such as to cause a greater degree of pressure on the inner than on the outer part of the foot. The pressure, directed from above downwards, bears more particularly on the internal part of the superior surface of the astragalus, whence it has a tendency to thrust this bone outwards. This same circumstance determines the greater frequency of dislocation of the ankle inwards; the axis of the under articulatory surface of the tibia on the astragalus, being slightly oblique from above downwards, and from without inwards; therefore, the tibia has a tendency to push the astragalus outwards, to cause a rupture of the internal lateral or deltoid ligament, and to become dislocated inwards, displacing, thus, the foot outwards. This result would be favoured by any cause producing at the same time a spasmodic action of the muscles, which send their tendons behind the malleolus internus, and which would occasion a sudden inversion of the foot. In this case, as a conjoint effect, the astragalus might be violently thrust outwards, with a change of axis, as in Partington's and other cases; thus, we should

have dislocation of the astragalus outwards, complicated with that of the tibia inwards.

Dislocation complicated with Fracture.—Some of the examples recorded were accompanied with fracture of one or both bones of the leg; and in one instance, with fracture of the os calcis. A complication of this kind might impress us with a belief, that the accident would thereby be rendered more formidable in its characters; but this apprehension has not been confirmed by the results of cases in which this accompaniment occurred. So far as reduction is concerned, fracture of the bone of the leg or of the os calcis must offer facilities, proofs of which are given in cases 44, 9, and 11.

When dislocation is conjoined to fracture it is more frequently simple than compound, in the proportion, in our cases, of 9 to 5; the reason of this is explicable on the division of force, the force being divided between the two effects. On the side of the bones a moiety might produce a simple, whereas the total force, if concentrated in the bones, would produce compound fracture. In the same way, the violence being divided between the fracturing of the bone or bones, and the dislocation, would have the effect of causing the latter to be less in degree, and the soft parts to sustain less injury. This reasoning, which applies to luxations of the astragalus, is remarkably corroborated in compound dislocations of the ankle joint; which accident is admitted by the best authorities to be, generally speaking, less terrible and severe with than without fracture; provided the solution of continuity in the bone or bones be of a simple kind.

The late Mr. Hey, of Leeds (with the mention of

whose name can be associated only one feeling in the minds of every British surgeon), gave it as his opinion (forty years ago), that the loss of the limb is rarely necessary in a compound luxation of the tibia, which is not attended with any other injury except a fracture of the fibula; and this, he thought, must of course take place whenever such a luxation occurs, unless the astragalus is also dislocated. Mr. Hey states, that he once saw a case of this kind, and mentions that a similar instance came under the notice of Mr. Gooch; in both cases the bones were irreducible, and it was judged to be absolutely necessary to amputate the limb.

Dislocation complicated with Luxation of the Ankle Joint.—There is one case (32) recorded in this report of compound dislocation of the astragalus, combined with that of the ankle. This accident is a most formidable one, and might, *primâ faciê*, be supposed to demand immediate amputation; but although few surgeons would be disposed to animadvert upon the adoption of this practice, yet success has attended the removal of the astragalus, and the subsequent replacement of the bones of the leg. In English surgery, cases of this kind have been published; and Baron Boyer mentions some examples of this accident where the astragalus was extracted, and the cases did well; and he considers the advantage of removing the bone to consist, not merely in facilitating the reduction of the bones of the leg to their proper position with respect to the foot, but in preventing the high degree of inflammatory action, and its consequences, which would be likely to ensue in case the bone was allowed to remain in its abnormal situation.

TABLE II.

CLASSIFICATION OF TREATMENT, AND RESULTS OF DISLOCATIONS OF THE ASTRAGALUS.

Cases.	*Direction.*	*Kind.*	*Treatment.*	*Results.*
No. 17 ...	Forwards and outwards ...	Complete, direct, and compound	1 *Partial reduction* .	Permanent inflexibility of joint.
29 ...	Inwards	Complete, direct, compound, and complicated, with fracture	2 The same	Case did well, with tolerable motion.
16 ...	Inwards and outwards ...	Partial, direct, and simple	1 *Complete reduction*	Case did well, with tolerable motion.
32 ...	Inwards	Complete, direct, compound, and complicated, with dislocation of the ankle	2 The same	Case did well—a useful foot.
44 ...	Backwards...	Complete, indirect, simple, and complicated, with fracture of the tibia ...	3 The same	Case did well—a useful foot.
6 ...	Forwards ...	Complete, direct, and simple	4 The same	Case did well—a useful foot.
9 ...	Forwards ...	Complete direct, simple, and complicated, with fracture of tibia & fibula	5 The same	Case did well—a useful foot.
11 ...	Forwards ...	Complete, direct, simple, and complicated, with fracture of the os calcis ...	6 The same	Case did well, with a useful foot, although some portions of the os calcis exfoliated.
22 ...	Forwards and outwards ...	Complete, indirect, and simple	1 *Bone allowed to remain in its new situation*	Permanent deformity & impaired motion.
37 ...	Outwards ...	Complete, direct, simple, and complicated, with fracture of tibia	2 The same	Imperfect motion.
39, 40, 41, 42, 43 ...	Backwards...	Complete and simple	3 The same (5 cases)	A very useful foot remained in all.
4 ...	Forwards ...	Partial, simple, and complicated, with fracture of tibia	4 The same	Result not known.
5 ...	Forwards ...	Complete, direct, and simple	5 The same	Anchylosis of the joint.
13 ...	Forwards and inwards ...	.....	6 The same	Deformity and permanent lameness.
1 ...	Forwards ...	Partial, direct, and simple	1 *Partial excision* ...	A very useful foot.
2 ...	Forwards ...	Partial, direct, and compound	2 The same	The same.
3 ...	Forwards ...	... .	3	Anchylosis.
29 ...	Inwards	Complete, direct, compound, and complicated, with fracture of tibia & fib.	4 The same	Case did well, with a useful foot.
30 ...	.....	Complete, direct, compound, & complicated, with fracture of the astragalus	5 The same	With little deformity in length, and a useful foot.
31 ...	.....	Complete, direct, compound, and complicated, with fracture of tibia, fibula, and astragalus	6 The same	The limb but little shorter than the other, and the patient walks well.
7 ...	Forwards ...	Complete, direct, and compound	1 *Complete excision* .	A useful foot.
10 ...	Forwards ...	Complete, direct, simple, and complicated, with fracture	2 The same	Anchylosis.
14 ...	Forwards and inwards.....	Complete, direct, simple, and complicated, with fracture of the tibia	3 The same; about 14 weeks after the accident, the bone being allowed to slough.....	With fair and increasing motion.
18 ...	Forwards and outwards ...	Complete, direct, and compound	4 Complete excision	A useful foot.
19 ...	.....	.....	5 The same	Death from extensive suppuration.
20 ...	.....	Complete, direct, simple, and complicated, with fracture	6 The same; bone sloughed, and removed after four weeks	Case did well, with a useful foot.
21 ...	.....	Complete, direct, compound, and complicated, with frac. of the astragalus...	7 The same	Death from phlegmonoid erysipelas, or diffuse cellular inflammation.
23 ...	.....	Complete, indirect, and simple	8 Bone sloughed, & was excised ten weeks after the accident	A useful foot.
24 ...	.....	Complete, indirect, compound, and complicated, with fracture of the fibula and astragalus	9 Complete excision	A useful foot.
26 ...	Upwards and outwards ...	Complete and compound	10 Bone sloughed, & was excised seven or eight months after the accident	A very useful foot.
27 ...	Forwards ...	Complete, direct, and compound	11 Bone excised ...	A useful foot.
28 ...	.....	Complete, direct, and compound	12 The same	A useful foot.
33 ...	Outwards ...	....	13 Bone sloughed, & was extracted after 14 weeks	A useful foot.
34 ...	.....	.....	14 Bone excised ...	A useful foot.
35 ...	.....	.....	15 Bone excised on the 11th day	Death, from extensive suppuration.
36 ...	.....	.....	16 Bone excised on the 2nd day	Death, from imprudence on the part of patient's friends.
38 ...	.....	Complete, indirect, and simple	17 Bone sloughed, & was excised on the 33rd day.....	A useful foot.
45 ...	Outwards, downwards, & backwards ..	Complete, indirect, and compound	18 Instant excision	A useful foot.
8 ...	Forwards ...	Direct and compound	1 *Amputation*, reason not known...	Recovery.
12 ...	Forwards and inwards	Complete, direct, and simple	2 The same	Not recorded.
15 ...	.....	Complete, indirect, and simple	3 Amputation, from sloughing & disease of ankle ...	Recovery.
25 ...	Outwards ...	Complete, indirect, compound, and complicated	4 Amputation, in consequence of its being united with compound fracture of the fibula & the bad constitution of the patient	Recovery.

*** This table will be found to contain 46 instead of 45 examples (according to recorded cases.) The explanation of this difference is, that case 29 presents itself under two points of view: first, as giving an example of partial reduction; and, secondly, that of partial excision.

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SUMMARY OF TREATMENT IN CASES.

Cases of partial reduction	2	Compound	1	
		Complicated	1	Simple and complicated 0 Compound and complicated 1
Cases of complete reduction	6	Simple	3	
		Compound	0	
		Complicated	3	Simple and complicated 2 Compound and complicated 1
Cases where the astragalus was allowed to remain in its new situation	10	Simple	8	
		Compound	0	
		Complicated	2	Simple and complicated 2 Compound and complicated 0
Cases of partial excision	6	Simple	1	
		Compound	2	
		Complicated	3	Simple and complicated 0 Compound and complicated 3
Cases of complete excision	18	Simple	2	
		Compound	11	
		Complicated	5	Simple and complicated 3 Compound and complicated 2
Cases of amputation	4	Simple	2	
		Compound	1	
		Complicated	1	Simple and complicated 0 Compound and complicated 1
Total	46			

SUMMARY OF RESULTS.

No.				
2	Partial reduction	Permanent inflexibility	1	2
		Tolerable motion	1	
6	Complete reduction	All did well, with tolerable, and in some with perfect, motion		6
10	Bone allowed to remain in its new locality	Anchylosis	1	10
		Deformity and impaired motion	2	
		Imperfect motion	1	
		Result not published	1	
		Useful foot (all backwards)	5	
6	Partial excision	Deformity and permanent lameness	1	6
		Deformity, with a tolerable foot	1	
		Anchylosis	1	
		Useful foot	3	
18	Complete excision	Anchylosis	1	18
		Useful foot	13	
		Death	4	
	In 10 the operation was immediate	Simple cases	3	18
	— 1 on the 2nd day	Simple and complicated	3	
	— 1 on the 11th day	Compound cases	10	
	— 1 after four weeks	Compound and complicated	2	
	— 1 after 33 days			
	— 1 after 10 weeks			
	— 2 after 14 weeks			
	— 1 after seven months			
4	Amputation	Recovery	3	4
		Not recorded	1	

REMARKS ON TABLE II.

In this table the author has given, in a convenient form, the treatment and results under which heads he has arranged his cases, with a view to illustration. The treatment is comprehended under the following divisions :—

1 Partial reduction.
2 Complete reduction
3 Left to nature in its new situation.
4 Partial excision.
5 Complete excision.
6 Amputation.

Partial reduction is shown by the results to be (as we might, *à priori,* suppose) less favourable than *complete reduction,* In dislocations backwards, the sequel of *allowing the bone to remain in its new situation* has been most satisfactory ; but not so in dislocations in the other directions. *Partial excision* left a useful foot in three out of six cases ; in the remaining three there were deformity, lameness, and anchylosis. The results of *complete extirpation* of the astragalus have been very encouraging, when we consider the desperate character of the accident which demands this formidable mode of procedure. In 13 cases out of 18, a very useful limb remained ; in one only was there true anchylosis, and death occurred in four cases. In no simple case was there a fatal result ; it is, therefore, to be presumed, that death happened rather from the conjoint injuries which the soft parts sustained by the violence which produced the compound, and compound and

complicated luxation of the bone, or by the force used in attempts at reduction, or both united, than from the operation itself; and there is a weighty argument in support of this opinion, in the fact, that the cause of death in the four examples was diffuse cellular inflammation, extensive suppuration, sloughing, &c., the latter being the sequel of the former; and as affording additional evidence of this truth, it may be mentioned, that in three out of the four cases the accident was *compound* and *uncomplicated;* therefore cases where there was no division of the effects of force, but a direct concentration of it on the joints and surrounding textures. That the degree of injury which the soft circumjacent tissues receive, has a material effect in influencing the result, is further demonstrated by the fact, that dislocations in the anterior and posterior aspects of the foot, do much better than lateral luxations, as they are not usually accompanied with so much laceration of the ligaments, tendons, fasciæ, and skin, in the former as in the latter localities.

PRINCIPLES OF TREATMENT IN DISLOCATIONS OF THE ASTRAGALUS.

REDUCTION.

As a general principle, the surgery of dislocations consists in the replacement of the bone in its natural situation. This rule admits of very few exceptions; certain forms and kinds of luxation of the astragalus do, however, constitute some of them. It is a very material point, connected with the partial bearing of our present enquiry, to premise, that

we ought carefully to distinguish between practical and complete luxation, *i. e.*, between a case where the bone has been incompletely, and that where it has been wholly thrust from its articular connexions. Incomplete dislocation can rarely occur in the articular or ball and socket joints, but may often happen in the irregular and ginglymoid articulations; and it is, therefore, easily understood, why, on this account, the astragalus is liable to this accident.

We have spoken of reduction under the two heads, partial and complete. The partial reduction of a complete dislocation must, one would suppose, be as difficult to effect as complete reduction, as the pre-requisite conditions for the former are the same as those of the latter: in one instance only has this been done, and the result was not very encouraging; and it is quite certain that if the bone can be partially reduced, the unreducible portion, in case the dislocation be compound, should be excised, to prevent the foot from becoming permanently fixed by the mechanical obstacle which the projecting bone opposes to the movements of the ankle. To partially reduce a dislocated bone is, *in ipso facto*, to put the limb in the condition of partial luxation, the treatment of which involves the questions of reducibility and irreducibility, to the consideration of which subjects we shall now devote our full attention.

If the astragalus be partially dislocated, and not twisted round, as it often is when the dislocation is complete, there is reason to hope that reduction may be accomplished; because if the bone retains,

in part, its position between the tibia and os calcis, the main obstacle to success, namely, the forcible traction of the one bone to the other, will not occur; this obstacle to reduction, which exists in all cases of complete luxation of the bone, in whatever direction the astragalus may be ejected from its articular surfaces, is not brought about by the action of the gastrocnemii alone, but by all the muscles which pass from the leg to the foot, behind the malleoli; and therefore, although we should gain a point in bending the leg upon the knee, by which we relax the gastrocnemius externus and plantaris, we cannot annihilate the action of the soleus, the paronei, tibialis posticus, and flexor muscles of the toes, in the same way; as the foot is in this accident often fixed, and cannot be extended, so as to enable us to put these muscles in a state of relaxation. In cases where the astragalus is changed in its position, the bone is always very firmly locked in its new situation. It is recorded that in three or four instances in which M. Dupuytren extirpated the astragalus, he found the bone fairly turned over upon itself, and the same has been noticed by the author and by other surgeons. This eminent surgeon, (Baron D.,) reasoning upon this fact, states "that we cannot be much surprised that the reduction of dislocation of the astragalus is so difficult, or even altogether impracticable; but even when this bone has not become reversed, we shall find that the configuration of its articulating surfaces, and of the os calcis, suggests a very obvious explanation of the danger of their forcible disjunction, and separation."

He continues: "The posterior part of the astragalus forms a claw-like process, which, when carried forwards, rests between the two articulating prominences of the upper surface of the os calcis, where, indeed, it is so confined that it can scarcely be moved. Any attempt, therefore, to force it back into its normal situation, has often the effect rather of pressing the point of the process against the spongy substance of the os calcis, than of lifting it out of the groove in which it has become lodged." These remarks, however, do not apply to complete but to *partial* luxation forwards, as the author has endeavoured to show in a former part of this paper; he ventures, therefore, to correct this error, having satisfied himself, by anatomical examination, that the remark is erroneous as applied to *complete* luxation in any direction. In considering the subject of reducibility and irreducibility of the astragalus, when completely luxated, we must always remember that the bones of the leg are actively and forcibly drawn towards the os calcis, so as to obliterate the space normally occupied by the astragalus. This being admitted, the question of reduction involves, firstly, the possibility of separating the bones of the leg from the os calcis, to such an extent as will admit of the replacement of the dislocated bone. If the space gained by extension, counter-extension, and other manœuvring, be sufficient for this purpose, if the bone be not much detached from its connecting textures, and not inverted, everted, or turned upon itself in any considerable degree, it might be restored to its primitive situation; but the safety of returning it is the next and a very serious considera-

tion ; since, if the bone be so loose and detached as to be capable of being easily reduced, is it not likely that it will die from want of sufficient vascular connexions; and shall we not thus put the patient in a more hazardous condition than if the astragalus had been excised or allowed to slough from its new situation? A reference to cases will prove, that in many instances of dislocation forwards, inwards and outwards, simple as well as compound, that the bone sloughed where extraction was not performed; but in the instances of luxation backwards, the bone scarcely seemed to act at all as an extraneous body, *i. e.*, it neither died nor did it excite any great amount of local or general disturbance; this difference in the results of dislocation backwards, when compared with anterior and lateral dislocations, justifies a more decided negative to extirpation of the bone in the former case than in the latter instances. In irreducible simple dislocations forwards, inwards, or outwards, the author would not extract the bone in the first instance, but in most compound cases he would not hesitate to do so without a moment's delay. In revising the subject of reduction, it is obvious that the rigid and unyielding approximation of the leg to the foot, by the powerful action of muscles, is the most insuperable obstacle to the replacement of the luxated bone; but although the main difficulty, it is not the only one: the bone may be girt by the capsule of the joint, and by tendons of muscles; but these are, comparatively speaking, trifling impediments in the way of reduction. It can easily be imagined that the girting effect of an opening in the synovial capsule,

only just large enough to give exit to the astragalus, would be one impediment to reduction; that the circumstances of the bone being embraced by the fibres of the torn ligament, by separated and displaced tendons, and by the edges of a small integumental opening, would all and severally oppose replacement; but they would not prove insuperable obstacles, as the opening in each may be extended. It is said that Desault's practice, in one case of dislocation of the head of the bone from the navicular cavity, was to divide the integuments and ligaments, and that he then reduced the luxation with facility; but it is to be remarked here, that this case was one of dislocation of the tarsal joint, between the astragalus and os naviculare, and not of the former bone from the tibia and calcaneum. The distinction is most important. But it is also stated, that in a case where the astragalus was disarticulated from the calcaneum, as well as from the os naviculare, and turned upon itself, Desault effected reduction with ease. It is to be remarked here, that the dislocation was simple, and probably, therefore, partial; or if not, the bones must have been so far rendered moveable, by the laceration of their ligaments, as to admit of being separated from each other to such an extent as to permit the replacement of the bone; indeed, it is impossible to suppose otherwise, as it is said that he returned the bone "by pressure with his fingers."

But, since the tracting influence of muscles seems to be the most unmanageable obstacle, the question may here be put, would tenotomy, or the division of the tendons passing behind the ankle

to the foot, be justifiable as a means of annihilating the action of these muscles on the foot? This question was put to the author by Mr. Crosse, of Norwich, at the Exeter meeting, and on reflection he thinks it is one well deserving attention. It is quite certain that the division of the tendons which pass to the heel, and behind the malleoli, would have the effect of subduing the action of the muscles which draw the foot to the leg, and fix it there; but there are considerations connected with this practice: firstly, we must here revert to the observations which we made when speaking of reduction, namely, that the astragalus may be so far insulated from its soft attachments, from which the periosteum derives its vessels, as to render the death of the bone inevitable; in which case it would act as a foreign body, and more harm than good would result from its replacement. Secondly, if the tendons were cut through behind the ankles, they would be retracted in their thecæ so as to lose all attachment with the bones of the foot; the foot, therefore, would become a passive appendage to the leg, and would furnish no basis for it unless anchylosis (which is not the most favorable termination) took place, and the proper angle of the foot with the leg preserved. It is stated by the late Mr. Wilson, in his "Lectures on the Bones," that in a case of displacement of the peroneus longus and brevis, from rupture of the ligament which confines them behind the malleolus externus, he recommended (in consequence of severe suffering) a removal of part of the tendon of the peroneus longus, which was followed by shrinking and con-

traction of the muscle *to the full extent*, consequently its use was lost; but this objection to tenotomy would not be valid if the tendon of the gastrocnemii alone were divided; and as this operation, which is easily performed, might give us a great controul over muscular action, its adoption may I think be seriously entertained, provided the bone be not so far extruded as to cause its death: this objection would, however, have no weight in partial dislocation, therefore the suggestion in this case is feasible, and might be adopted with some chance of success. Tenotomy may thus be regarded as a means of facilitating reduction, and in this point of view the practice is justifiable. As an auxiliary measure, the late Sir A. Cooper gave tartrate of antimony in full nauseating doses, for the purpose of weakening the resistance of muscles; and in full plethoric patients blood-letting may be conjoined as a useful adjuvant. Matters being thus far prepared, the next object is to place the patient in a recumbent position, to bend the thigh upon the trunk, and the leg upon the thigh; continued extension and counter extension of the leg and foot are then to be kept up by means of pulleys, until sufficient space is gained for the return of the astragalus. When the dislocation is partial, reduction may be effected: so, also, when there is fracture of the leg, fracture of the os calcis, or dissevering of the bones of the tarsus without or with fracture. Baron Dupuytren, seeing the difficulties to contend with, asks the question, "how comes it, in some cases of this dislocation, the reduction is accomplished with the greatest ease?" His answer is

ready "in supposing that all the connecting ligaments have been torn and detached, so that a much freer motion than is common is permitted between the bones of the leg and tarsus;" and this, doubtless, has been the fact in almost all reported cases of reduction of *complete* luxation of the astragalus.

In complete compound dislocations of the astragalus alone, without fracture or solution of continuity and connexion in the bones and joints of the tarsus, all attempts at reduction are not only hopeless but prejudicial; and although we may be justified in hazarding the chance of allowing the bone to continue in its new situation, where the luxation is simple, extirpation ought always to be performed when the accident is of a compound kind. The author's colleague, Mr. Ainsworth, senior surgeon to the Manchester Royal Infirmary, and who has been connected with this institution more than thirty years, never saw a complete case reduced; neither has Mr. Thorpe, who has been surgeon to the same institution upwards of twenty years. Mr. Wilson, in company with the late Mr. Ransome, witnessed reduction in one instance. The Messrs. Hey of Leeds, Mr. Smith, who has had more experience in this accident than almost any provincial or London surgeon, and Mr. Teale, surgeons to the Leeds Infirmary, never saw a case reduced; and the author cannot learn of any reduction having been accomplished in the Liverpool, Bristol, or any other provincial hospital. But the discouragement does not arise from the non-success of the practice alone, but from the mischief which often results

from torturing attempts at reduction. In more than one instance the dislocation has been made to pass from a simple to a compound form. Sir A. Cooper acknowledges, that in one of the cases which he witnessed, sloughing of the integuments was brought about by the continued extension and force used to reduce the bone; and the author has recently seen a case of diffuse cellular inflammation, extensive suppuration, fascial sloughing, and death, which arose, in all probability, from the pressure of the bandages and apparatus employed in reiterated violent efforts to reduce an irreducible dislocation.

It is remarkable that, in the face of all these arguments, reduction has been said to be accomplished "with facility." In these cases, we may rest assured, there must have been a considerable laceration of the ligaments, or severing of the joints, displacement of the bones, or two or more of these effects combined; for it is not in the nature of possibilities for reduction to be effected without the means of gaining sufficient space for the re-introduction of the bone. If the astragalus be completely luxated, whether in a simple or compound way, and there is no derangement in the position of other parts about the joint, save the approximation of the tibia and fibula to the os calcis, which, I contend, is the invariable attendant on *complete* luxation, the bone is almost immoveably fixed in its new situation, and reduction is almost impossible; and, again, when the bone is reversed in position, or thrown out of its natural axis, replacement is absolutely impracticable. The table shows us, that out of 45 cases there were six reductions;

of these, one was partial, direct, and simple, where, therefore, the normal space for the astragalus was not obliterated; another case was complete, direct, and simple; a third case was complete, direct, compound, and complicated, with dislocation of the ankle; two cases were simple and complicated with fracture; one of the tibia, another of the tibia and fibula; and in a sixth case, the dislocation was united with fracture of the os calcis, which was comminuted in such a way as to destroy the vitality of some of its fragments, they having exfoliated during the progress of cure. One of these cases only (namely the second) can be said to militate against the author's conviction, that the astragalus when completely dislocated and alone, *i. e.*, without fracture, disjointed tarsal bones, or dislocation of the ankle, is an irreducible dislocation, and that all attempts at accomplishing reduction are worse than useless; that to the violence used we may attribute much of the mischief which arises from diffuse cellular inflammation, from immediate gangrene, induced in the parts by the direct pressure which has been applied, and other destructive consequences, which increase, in a very marked degree, the dangers of the accident. The successful case referred to was communicated to the author by Mr. Gaskell, a surgeon on whom he can fully rely for correct information, and for the exercise of sound and discriminating judgment; but he can conceive a mistake to be made in discriminating between partial and complete dislocation, unless attention be paid to the only infallible criterion, namely, the obliteration of the tibio-calcaneal space by the traction of the foot on the

leg. It is obvious that this was overlooked by the celebrated Dupuytren, when he said, that the impediment to the reduction of complete dislocation is the fixed implantation of the posterior hook-like process of the astragalus in the irregular concavity between the articular surfaces of the os calcis; for it will be readily seen, that if the unciform process of the astragalus be thus situated, the bone cannot have been wholly ejected from the tibio calcaneal space; it follows, therefore, that the tibia is prevented from descending, and that the dislocation is not complete. The author is very anxious to call attention to this point, as it may lead to a more accurate classification of the accidents which occur to this bone. Still, however, here the case was simple. No case of isolated compound dislocation is recorded; we presume, therefore, that no such case has ever occurred. We are, consequently, quite safe in deducing, from this fact, the principle, that although reduction in complete simple isolated luxation of the astragalus is possible, it having been exemplified in 1 case in 16, (there being in our report 45 cases, 16 of which are simple dislocation,) yet there is no example of the reduction of complete compound isolated luxation, although 15 cases of this accident have been communicated. Three single, and complicated with fractures, making one in seven recorded cases; and one compound and complicated, with dislocation of the ankle joint, are not such as would render replacement impossible; because, in fracture of the tibia and fibula, the purchase of the muscles, passing from the leg to the foot, behind the malleoli, is impaired,

and space is given, or can be obtained, by the mobility of the malleolar processes; and in dislocation of the astragalus, conjoined to that of the bones of the foot, there is implied considerable rupture of ligaments and other binding textures; therefore, not only space but ease in manipulation must result from it.

These facts point out the urgency of establishing principles of treatment in the different kinds of luxation of the astragalus, and of leaving the subject no longer in doubt. It may be considered presumptuous in the author to attempt this arduous undertaking, but if he can do no more than show that the inquiry is open to, and demands investigation, he will rest satisfied with the hope that more experienced men may enter the arena of this important and interesting practical inquiry.

THE PRACTICE OF ALLOWING THE ASTRAGALUS TO REMAIN IN ITS NEW SITUATION.

If the astragalus cannot be reduced, the inquiry which next obtrudes itself upon us is, whether the dislocated bone ought to be permitted to remain in its abnormal situation, with the hope that, should it not die, nature will in time accommodate herself to its presence, and experience therefrom no great degree of inconvenience; and that, should it die, whether ulceration will ensue and the bone be cast off by natural means? The question is one which demands deliberate consideration. We have seen, in the detail of cases, that in all the dislocations backwards (one excepted) the cases were left to nature, and did well; the conclusion, therefore,

at which we may safely arrive is, that in this kind of luxation we are not to interfere, except by making reasonable efforts, at reduction; for the case ought not to be abandoned without hope, as Mr. Liston succeeded, on one occasion, in reducing the bone. The author stated that in one instance of luxation of the astragalus from the os naviculare, the bone was allowed to remain in its new situation; and although the movements of the foot were for some time restrained, yet ultimately they became free. This is encouraging in reference to this form of accident, and may be applied to confirm the belief, that if the astragalus be partially and simply luxated either forwards, outwards, or inwards, and is irreducible, we should not interfere, but leave the case to the resources of nature. But what is to be done in case the dislocation is *complete, although simple?* Mr. Syme, Baron Larrey, and some other surgeons, advocate removal of the bone. Boyer and others seem by their practice to be opposed to this opinion. The author will examine the arguments which may be brought forwards on both sides of the question. It may be argued, on the side of removal of the luxated astragalus, that the presence of the bone cannot fail to create a great amount of local irritation and inflammation, which will endanger the limb, if not the life of the patient, by bringing on diffuse cellular inflammation, suppuration, sloughing, involving the tendons, their thecæ and synovial lining, which will form a route for the extension of mischief to the ankle and leg; and that if the bone should die, these results are certain. It is very true that in almost every instance the above

anticipations with respect to the limb have been realized; but still death did not occur in any case, and a tolerably useful limb has been the result in the majority of examples in which the bone was left, until, by the sloughing process, it became so loosened from its connexions as to admit of easy extraction. The arguments which may be adduced against excision are, that as the bone does not necessarily die, it may not act as a foreign body, and excite inflammation, and its sequelæ; and that should it die and slough, it will be extricated by a natural process. This is true, at least probably so; but the result anticipated in this last proposition is by no means a sequitur. If the vitality of the bone be destroyed, it must create a greater degree of inflammation, suppuration, ulceration, and sloughing, in the contiguous living textures, than if the bone were to continue to live; and the disturbance of the system and constitutional irritation would be proportionate. This, therefore, in theory, cannot be a safe state of matters, either for life or limb; but if we go to the facts of the case, as evidenced by results, our theory is not valid or confirmed by the test of experience. It may be argued, too, that to make an incision down upon the bone and to extract it, is objectionable, as it converts a simple into a compound dislocation, and thereby the case is rendered infinitely more hazardous. Experience has not fully realized this apprehension, still the argument is not without its weight in the scale of probable consequences. The author thinks that the following is the safe line of practice:—In partial cases, whether simple or simple and compli-

cated, should attempts at reduction fail, there must be no operative interference. In partial and compound, or compound and complicated, (reduction failing,) excision, if practicable, of the protruded portion of bone should be performed. This proceeding gives great facilities to the proper adaptation of the parts; but leaving this out of the question, by neglecting partial excison we incur one of two risks: firstly, the exposed or prominent part of the bone may die, and the patient have to undergo the tedious and trying processes of inflammation, suppuration, and exfoliation, and the death of one part of the bone may endanger the vitality or disease of the remainder, and ultimately involve the ankle joint (as in one of M. Boyer's cases), and demand, as a last resource, amputation, as the means which alone could give to the patient a chance of life; and if the extruded portion of bone should not be excised, and continue to live, its presence would so far restrain the action of the ankle as to produce permanent contraction of the heel, permanent inflexibility, and permanent lameness, as in one of our recorded cases. It is, however, to be remembered that this practice does not apply to *partial* and *simple* dislocation of the astragalus in *any* direction; for the justifiability of operation in partial luxation, when there is no external wound having a direct communication with the displaced bone, is very questionable. The practical proceeding in complete and simple, or simple and complicated dislocation, will be determined by the position of the bone: if its protrusion be direct, in reference to its axis, and cannot be

reduced by moderate efforts, the case ought to be left to nature, because, although the chances are against its remaining passive, it will be well to wait the event; and should the skin inflame, and other matters predicate the tendency to ulcerate through, it will be better to save the patient this source of irritation, by an incision over the site of the astragalus, and leave the extrication of the bone to the efforts of nature, or at all events until it is so loose as to be easily extracted. The grounds of this practice are, to take off tension, to abridge the process of ulceration, and to put the parts in such a position as will remove pressure from the adjacent textures.

PARTIAL EXCISION.

In some of the cases which we have recorded, it will be perceived that the astragalus was partially removed; and in others, the bone being fractured as well as dislocated, one or more of the fragments escaped, or were extracted through the wound. Mr. Lowe partially excised the astragalus, *i. e.*, removed the projecting portion of bone, in partial luxation, and reduced the remainder, and the case did well; and in contradistinction to this practice there is an instance given where the prominent portion of bone was allowed to remain, and the result was permanent inflexibility of the foot.

In Mr. Ceeley's case, a part of the bone was excised by Mr. Bransby Cooper, which gave facility to the adaptation of the remaining portion.

Dr. Stevens's case gives us an example of fracture of the astragalus, combined with dislocation, where

a portion of the bone remained in the joint, and where a tolerable useful, but stiffish limb followed, with little deficiency in length.

In Mr. Sawyer's patient, the articulating surfaces for the os calcis were broken off from the upper part of the bone, and never came away; the result was that the patient had a little motion at the ankle, and the affected limb was of the same length as the sound one.

The author has been favoured with the following case by Mr. Gaskell:—

Peter Roberts, a healthy middle-aged man, sustained an injury by falling into a well of considerable depth; the astragalus was split into three or four portions, one of which had escaped through the wound of the integuments. About two months after the accident, a second portion of the astragalus, which had for some time previously lost its vitality, was withdrawn from the wound, and about the same time the surgeon had to contend with one or two attacks of hæmorrhage from the posterior tibial artery. The case remained in the hospital four or five months, and Mr. Gaskell afterwards attended him at home, where he remained a patient either four or five months, at the end of which time the wound had healed, and the thickening and swelling of the parts had considerably abated. The patient could not, for a considerable time after the healing of the sore, bear the whole weight of the body on the limb. He suffered much from constitutional irritation, and was greatly reduced in bodily strength. In about two years after the accident

this man called upon Mr. Gaskell, who found, on examining the limb, that a slight degree of rigidity and thickening remained. The patient could, however, walk well, and he was able to use the limb at his work (that of an excavator) with as much efficiency as before the accident. In this case about one-third of the astragalus came away.

It is the author's opinion, that in the majority of cases of dislocation of the astragalus, there is an accompanying fracture of the bone. He has examined the astragali removed by Mr. Taylor and Mr. Smith, and found them all more or less fractured, as was also the case in his own patient; but whether the bone is broken, as a conjoint effect of the dislocation, or in the operation of removing it, is a question not easily answered. In some instances this occurrence (fracture) may be a favourable coincidence, in others a decided evil and disadvantage. It may prove favourable, provided the fragment left in the joint retains its articular connexions with the os calcis, as it probably did in Dr. Stevens's, and most certainly did in Mr. Sawyer's case, as it may continue to live, and prevent the limb from shortening so much as it ordinarily does when the astragalus is wholly removed; but it may be productive of the evil of inducing true anchylosis by throwing out osseous juice, which may cement the tibia to the os calcis, and thus impede the movements of the ankle; and should the fragment die, the cure, to say the least, would be protracted, and the danger of the case materially augmented.

COMPLETE EXCISION OF THE ASTRAGALUS.

It is no longer problematical, as to the expediency and safety of extracting the astragalus in certain cases of dislocation of this bone; for in addition to the eighteen examples given in the table, there are others mentioned in the progress of our inquiry; and it will be remembered that the operation was successfully performed by Fabricius de Hilden, by Larrey, and by the late Mr. Trye, of Gloucester, and doubtless by many others, whose cases have not been made known to the profession through the medium of the medical press.

The testimony of our most distinguished British surgeons, and of those on the continent, is in favour of excision. Baron Larcy, who had not seen many cases of luxation of the astragalus, has given it as his opinion, that it is an accident which requires extraction of the bone; and Baron Boyer, who has written most ably on the subject of dislocations, says, "that if the astragalus has almost escaped through the wound in the integuments, and the ligaments much torn, the wisest course to adopt is to extract the bone, since in this case the astragalus must be considered as a foreign body; therefore, if it could be returned to its natural situation, it would not be likely to unite with the other bones of the foot, and, therefore, its presence there would be a source of serious consequence." It is an opinion to which every surgeon must subscribe, that if the astragalus were completely luxated and severed from all or most of its connecting textures, the best practice would be to extirpate the bone; but it is

important to determine in what instances it is particularly demanded. Our table will show the cases in which the operation of extracting the bone, either immediately or consecutively, was adopted, and it gives the results. In 18 cases, 13 recovered with useful limbs, one with anchylosis, and in four cases death ensued.

Few surgeons would, perhaps, be so bold as to propose immediate removal of the astragalus, without making, in the first instance, some attempts to replace the bone; and very few patients would be disposed to submit to the operation without a previous trial at reduction; but the author is of opinion, that in some kinds of luxation all attempts to reduce the bone should be abandoned, not only because experience has proved that they will be ineffective, but because the violence done in the extension and counter extension of the foot and leg will do positive mischief. It is not necessary to do more than to refer the reader to our remarks on the treatment of partial irreducible dislocation, to show that cases of this kind are not such as demand excision of the bone, and we have anticipated any observations which might here be introduced as to the treatment of complete simple, or simple and complicated luxations. Complete excision may be called for, sooner or later, in the progress of the case, or its performance may be immediate. Simple cases may be followed by the death of the bone, subsequent ulceration, and sloughing, consequent upon which it may be required to excise the bone from its ligamentous and cellular connexions. The author has ventured an opinion that nature ought to be

aided in the ulcerative process of the skin and subjacent fascial textures by incision, and that the surgeon's subsequent aid is useful in extirpating the bone. When simple and complete dislocation is indirect, *i. e.*, attended with altered axis of the bone, it is fair to presume that the astragalus has been so far severed from all its connexions as to die infallibly, in which case, the author would propose immediate incision over the bone, with a view to remove tension and to expedite its escape ; but it might not be proper to proceed to the immediate excision of the astragalus. But in isolated compound dislocations no attempt should be made to reduce, but extirpation immediately had recourse to ; and especially, and beyond all controversy, if the bone be inverted, everted, or turned upon itself; for if this practice be not followed, the patient will, to say the least, remain a cripple for life, with his foot miserably distorted, or will incur imminent peril from inflammation, suppuration, and gangrene of the foot and leg, and probably loss of limb or life ; whereas, by the removal of the astragalus, he may recover with a useful foot, and be exposed to little comparative danger.

It being admitted that all complete, compound, and isolated dislocations of the astragalus require extirpation of the bone, a difference of opinion may arise amongst surgeons as to the period when the astragalus should be removed ; some advocating deferred, others, immediate excision. The author conjectures, that the advocates for postponing the operation, would argue, that immediate removal would cause a communication between the joint and

surface; but that, if deferred, a chance would be given of sealing up, by granulation and adhesion, the deeper seated parts about the joint before the bone was extricated. It is true that the astragalus has been excised or extracted at different periods after the accident and in some at very remote periods, as seen in the table; and yet the cases did well, without a fatal exception; but many of them were simple dislocations, which became compound by ulceration and sloughing; and where, therefore, the injury to soft textures was less severe than what happens in the rending and bruising accompaniments of compound dislocation. The sudden laceration and contusion of the integumental structures must heighten, in a considerable degree, the danger of the case. It was stated in another part of this paper, that the causes of death in all the fatal cases was diffuse cellular inflammation, extensive suppuration, and sloughing, induced, no doubt, more by the injury which the skin and sub-cutaneous tissues sustained, as the conjoint effect of the luxation, than from the operation required for the extraction of the bone. When the astragalus is dislocated forwards, inwards, or outwards, and is compound, it can hardly be doubted but that the bone will perish; therefore, *if reducible*, the replacement would be tantamount to the introduction of an extraneous body into the synovial capsule, and the consequence of such an intrusion on this sensible and morbidly disposed membrane may be readily foreseen.

It may be summarily stated, that in simple, direct, and complete luxation, the author advocates the

practice of allowing the bone to remain in its new situation, without any operation, until it manifests a tendency to ulcerate the skin, in which case he would make an incision over the bone to relieve tension and pressure ; and that when the bone is so far detached from the circumjacent textures by the natural process of separation, he would remove it. In simple, indirect, and complete luxation, he would anticipate, as a matter of certainty, that the bone would die and require dislodgment ; to take off tension and pressure from the angles of the displaced bone, he would at once make an incision over it, but not remove the bone, wishing to benefit by the probability that the exposure of the cavity of the joint may have an injurious effect. In complete compound luxation, whether direct or indirect, or complicated, with fracture or with dislocation of the ankle joint, he would immediately proceed to the removal of the astragalus, from believing that the limb will be put in a better condition for the reparative process of the joint, by the abstraction of the processes of inflammation, suppuration, ulceration, and sloughing (processes necessary to the disengagement of the astragalus by natural efforts) ; for if these be saved, nature will be able to direct, undividedly, her sanatory operations to the interior or deeper seated parts ; whereas, if her powers are divided between the extrication of the astragalus from its abnormal situation, and the reparation of the joint, they might be insufficient for the purposes required, and the limb or life fall a sacrifice.

May not the danger of compound fracture and dislocation over the simple forms of these accidents

depend, in some measure, on this division of reparative action, thereby the diminution of amount of natural efforts in each separate part? We know that a compound fracture or dislocation is divested of much of its formidableness, if the external wound can at once be healed by adhesion; nature often acts with great discrimination in concentrating her main energies to the repair of the greater evil, before she attempts much for the lesser; thus, if two injuries happen to the body at the same time, the one a simple the other a compound fracture, it generally follows that the compound will unite before the simple, the latter remaining for some time in a passive state; and if two injuries, equal in degree, occur in the body at the same time, nature's attempts to repair (being divided) will be tardy, if not altogether abortive.

The following very interesting cases will illustrate these facts:—

1. Communicated by Mr. Furnival, late house surgeon to the Infirmary.

A man, aged 18, was admitted December 2, 1840, under Mr. Fawdington, with *simple* fracture of the right humerus, and *compound* fracture of the ulna and radius of the same arm, with severe contusions of soft parts. Reduction effected in both.

January 15, 1841. Wound in fore arm almost healed, and sufficient union of the ulna and radius for the hand to be sustained without support. *No union in the humerus.*

February 10. Wound quite healed, radius and ulna firmly united; humerus still flexible at the point of fracture.

April 5. Fore arm quite consolidated and restored, humerus not yet quite firm. The patient feels a want of confidence in it.

Mr. Furnival has kindly given other cases illustrative of the same principle.

The following case communicated by the author's nephew, Mr. William Smith, late house surgeon, shows that in compound dislocation, combined with simple fracture, the former will get well before the latter:—

A youth, aged 12, had compound dislocation of the elbow joint, complicated with fracture of the head of the radius, and in the same arm there was simple fracture of the ulna, about its middle. Dislocation was reduced and fractures set. The wound at the elbow granulated and healed, and the motion of the joint was nearly restored before the fracture of the ulna seemed disposed to unite; eventually, however, reparation of both injuries was effected.

2. Numerous cases might be adduced to show the abortive efforts of nature, when two severe injuries exist in the same individual. The author has witnessed a melancholy instance of this very recently, in an accident occurring from machinery to both upper extremities, and which proved fatal, without scarcely any reparative effort, in about three weeks from the receipt of the injury.

The operation of excising the bone may be very easy, and free from danger when the bone has been almost wholly separated from its connecting ligaments and other textures; but in other cases its attachments may be so firm, and the space in which we have to dissect so much encroached upon by

displaced tendons, and the posterior tibial artery so denuded of its protecting coverings, as to render the operation of extirpating the bone not only exceedingly difficult, but without great care exceedingly dangerous; this latter circumstance, however, is the main source of danger, as the artery is much exposed, and in some instances it has ulcerated or sloughed, and gave issue to alarming hæmorrhage.

In Mr. Arnott's and Mr. Shaw's case at the Middlesex Hospital, an interesting and detailed account of which is given in the *Medical Gazette* for July 15, 1837, the utmost difficulty was experienced in the excising of the bone, so much so, that Mr. Shaw, under whose care the patient fell, in consequence of Mr. Arnott's absence from town, was obliged to remove it piece-meal. The case, however, did remarkably well; the proper bearings of the foot to the leg were preserved, the sole of the former came fairly to the ground; there was motion at the ankle, and apparently the right foot would prove as useful as the left for the purposes of support and progression.

The after treatment of the operation consists in placing the leg and foot in close apposition, with due attention to the proper angle of the one with the other; and in this position they are to be kept by splints and apparatus with foot board. Great caution is necessary to keep the tibia well applied to the os calcis, for if the former were to become displaced much backwards, there would be no union, and no joint, and the foot would become a loose and useless appendage to the bones of the leg. In almost every case the length of the affected

limb is diminished about one inch, a defect which may be easily compensated for by the use of a high-heeled shoe.

AMPUTATION.

In our report we have recorded some cases in which the limb was amputated in consequence of other severe injuries being associated with dislocation of the astragalus. This mode of proceeding urges upon us the subject of primary and subsequent amputation, subjects of great moment, and upon which the opinions of surgeons are, in some respects, at variance. The question of amputation in dislocations of the astragalus is one which, *a priori*, we should consider as often called for; but, miraculous as it appears to be, it is nevertheless true, that it need seldom be seriously entertained.

There appear to the author to exist anomalies in reference to injuries about the foot and ankle: first, in the fact of very many severe injuries of these parts, to wit, compound dislocations of the ankle-joint, and compound fractures implicating the joint, simple dislocations of the astragalus, complicated with dislocations and fractures of the tibia and fibula, compound luxations of the astragalus and other bones of the tarsus, with dislocations of the ankle, and sometimes fractures to boot, doing well, when the primary shock sustained is followed by the secondary shock of a severe operation. In the first of these instances, for example, by the sawing off of the extremities of the tibia and fibula, of which numerous successful cases are recorded; and in the other cases, more or less operative practices, as excision of bones, expo-

sure of joints, &c., and yet many of them do well. Comparatively speaking, how few is the number of deaths in these cases compared with the number of escapes from it, and the well-doing of the individuals who have been the subjects of these accidents. The anomaly consists, further, in the fact of these terrible cases doing well, notwithstanding the injuries occur in the lower extremity, and at a part most distantly removed from the centre of circulation, whence, as is commonly supposed, at the minimum point of reparative power. That dread which surgeons entertain with respect to wounds of joints, and disarticulation of bones, seems almost to vanish from the mind when the ankle and foot are concerned, since the annals of surgery furnish us with more terrible operations and practices, undertaken about this region, than about any other part where similar textures exist; and next to the knee, the ankle is the most complex of all the articulations. Whence the reason of this? Is it that we are really too apprehensive of mischief from meddling with joints, and are thus deterred from risking so much as we might safely do? It is very true that a compound dislocation is a serious matter; but many cases do extremely well. The author, therefore, thinks that our experience, with respect to this accident at the ankle and foot, should reasonably give us confidence in the resources of nature, aided by surgical art, wherever this accident may occur, provided the soft parts have escaped such an amount of laceration and bruising as would endanger sloughing and mischief, and risk the life of the sufferer.

The author has advanced an opinion, that more danger is to be apprehended from injury to the soft than to that of the hard parts. A luxation or a fracture is, abstractedly, not to be considered as a dangerous accident; which opinion is confirmed by the results of simple fractures and simple dislocations; but if the soft parts are much lacerated or contused, or both, the case is increased in danger in a remarkable degree; and the author finds that Mr. Banner, of Liverpool, agrees with him in this opinion, since he states in his excellent "Report of Fracture" occurring at the Northern Hospital, "that the danger of these accidents is in the ratio of the injury done to soft parts by the violence which broke the bone;" to which we may add, by the action subsequently set up in the structures affected. The injuries which require the consideration of *immediate amputation* of the limb, in connexion with our present inquiry, are laceration and contusion of soft parts, united with simple, simple and complicated, compound, compound and complicated dislocations. The injury to the circumjacent textures ought to be extremely severe ere amputation should be had recourse to; but no general rule can be given to the surgeon, since much must depend on the age, constitution, and habits of the patient. If young, and in vigorous health, the case may, in a general way, be hazarded; but in a person past the meridian of life, of unsound constitution, and further impaired by debauchery and over stimulation, amputation would become a matter for serious deliberation. A person more advanced in years, healthy, and not prema-

turely aged by excess, would stand a better chance than the last patient; therefore, more may be risked in this than in the preceding instance. The truth of these practical deductions might be illustrated by numerous examples; but two will be sufficient:—

A youth, about 19 years of age, was admitted into the Manchester Royal Infirmary as the author's patient, for compound and comminuted fracture about the head and neck of the humerus, with laceration of the capsular ligament of the joint; and the soft parts were injured to such an extent that, in full consultation with his colleagues, it was considered most advisable to amputate at the shoulder joint. The proposal was, however, resisted (fortunately, as matters turned out) by the patient and his friends; for although the progress of the case was slow (owing to the exfoliation of bone and other causes), and the cure protracted, yet he eventually recovered with anchylosis of the shoulder joint.

The above-mentioned shoulder case may be compared in character, but forms a striking contrast in result, with another that has recently come under the author's observation, at the same institution:—

A man, aged 42, but in constitution apparently upwards of 50, a window-cleaner, fell from a considerable height on a stone pavement. He was immediately sent to the hospital, when, on examination, it was found that he had sustained a very severe injury in the left shoulder. There was a compound and comminuted fracture of the head and anatomical neck of the humerus, a rupture of the capsular ligament of the joint, and an escape of the head of the bone to the inner side of the glenoid cavity

under the scapular extremity of the clavicle, with not much contusion of the soft parts, excepting at the point where the extremity of the shaft of the humerus had perforated the deltoid muscle and skin. In a consultation with his colleagues in this case, it was considered that, even if the age and constitution of the patient were propitious, the accident was an irreparable one; and as the head of the bone was insulated from all its articular connexions, a part of the shaft would die; and even if it lived, could by no means be brought into contact with bone, so as to form anchylosis. Amputation at the shoulder joint was proposed, but the patient would not consent, and he lingered six weeks without scarcely any effort in the system to repair the injury about the joint. After death it was discovered that the head of the bone lay under the coracoid process, that there was a transverse fracture through about two-thirds of the *anatomical* neck, when the course of the fracture was changed to a longitudinal direction, and separated the lesser tubercle of the humerus from the body of the bone. The greater tubercle was likewise detached and isolated in the wound, and not the slightest attempt at reparation could be discovered. In this case, age, united to a leuco-phlegmatic temperament, gave a different turn to the results of the accident, which was not more severe than in the preceding instance.

Subsequent amputation of the limb may be demanded at different periods after the accident: some days may elapse, when traumatic gangrene may manifest itself, either from the means used to

effect reduction (a cause which the author believes to be a common one, if not of gangrene, of phlegmonous or phlegmono-erysipelatous inflammation, from the havoc which it makes with the sub-cutaneous fascia, tendons, and cellular textures), or as the conjoint effect of the violence which produced the dislocation. Consecutive amputation is, further, a question of expediency, which may be entertained in case of deficient reparative powers, and in extensive suppuration, sloughing, &c., of reticular and other textures, which may induce tetanus, and a fatal issue.

It is a critical point to decide when amputation is demanded, or when it can most safely and most successfully be performed, after severe injuries have been inflicted on the body. For the basis of our decision we must look to the results of experience in military and general hospitals; and reason on the immediate and consecutive circumstances connected with them. The first of these involve the effects produced in the individual, and the structure or structures implicated. The second have reference to the action set up in the mutilated part. The immediate attendant on almost every severe injury is a shock on the nervous system, indicated by great prostration of strength, and a suspension more or less of vital force, manifested by collapse, which is of variable duration, between six and 24 hours. In this stage of the injury the patient may sink, a consequence often witnessed in railway accidents. The question in this case is, ought the mutilated part (if it be an extremity) to be removed, notwithstanding the state of collapse, from which the

patient cannot be made to rally even with the free use of stimulants? The author's opportunity for observation has confirmed him in the opinion that amputation ought not in this case to be performed, unless there is an obvious cause for the sinking condition of the patient, as from hæmorrhage, and which an operation would put a stop to. It usually happens sooner or later, according to the constitution of the patient and the nature of the injury, that the period of collapse is followed by reaction, or return of strength and vital functions.

After every species of violence offered to the body, whether accidental or from operations, a certain degree of reaction is essential, the limits of which sanatory process are prescribed by the *vis medicatrix naturæ*; but owing to various circumstances connected with the health of the patient and the injury received, nature may be too active or not active enough in her reparative proceedings, in which case she will require to be controuled or assisted. If not successful in her efforts, it becomes a question whether the removal of the injured part would do good? The decision will hinge on the consideration, that although the patient may not have rallying powers sufficient to overcome the injury inflicted on the body (in form of lacerated wound, &c.), yet he may have enough to answer the demand made upon the constitution for the healing of a stump. There can be no question but that this (the reactive period) is the most favourable season for operation, and ought to be selected in preference to any other when an operation is rendered necessary. The third sequela of the

accident is the inflammatory period, which is indicated by constitutional irritation and fever; these symptoms are sympathetic of the injury, to repair which nature is making her first struggle in the form of reparative healthy inflammation, which draws in a temporary disturbance of the general system. This is not a season for operation; the surgeon, therefore, looks with anxious anticipation to the way in which this state of things will terminate. It may end in suppuration, which if limited may prove a prelude to recovery, but if extensive it may exhaust the powers of the patient and urge upon us again the question of amputation; respecting the propriety of which practice, the author's mind is fully confirmed from experience and observation in numbers of cases. Unhealthy and destructive, instead of healthy suppurative action, will sometimes follow in the form of diffuse cellular suppuration and sloughing, in which case the question of amputation will again obtrude itself on our attention. In the majority of cases these sequelæ of accident are dependent on constitutional causes, either direct or indirect; therefore, operation in the way of amputation will be a hazardous and inadmissible proceeding.

Gangrene of parts as the result of accident may be traumatic, or a mode in which inflammation terminates. The immediate death of a part from violence, as gun-shot wound of blood vessels, does not contra-indicate, but positively demands amputation. This practice has been confirmed by the united testimony of the best surgical authorities in military and civil surgery. Even in spreading

traumatic gangrene, amputation has been performed by Mr Toogood of Bridgwater, and by Mr. Porter, of Dublin, with perfect success.

It will be seen, however, on examining the cases operated upon for irreducible luxation of the astragalus, that extensive suppuration and sloughing have taken place, and drawn in a train of general bad symptoms, which in some cases have proved fatal. The practice of free incisions, and supplying the strength of the patient, are the means most to be relied upon; but if unsuccessful, amputation may be called for, and has been successfully performed.

These rules appear to the author to be a correct summary of the principles which ought to guide us in our decision as to the propriety of amputation in the different stages of severe injury.

RESULTS OF DISLOCATIONS OF THE ASTRAGALUS.

The results of dislocations of the astragalus may be divided into primary and ultimate. The former of these refer to the circumstances which manifest themselves during the progress of the case; the latter to its issue or termination.

PRIMARY RESULTS.

In these are included the amount of local action and constitutional irritation necessary to the function of repair; which constitutes a period of very great importance, demanding the closest watching and attention. It may be salutary, or may go on to a destructive extent, and the result will be favourable or otherwise, according to the degree of inflammation which follows the injury. Con-

stitutional irritation is, as we have remarked, a necessary accompaniment of every violence inflicted on the body; but to discriminate between salutary and morbid action, requires experience, and a perfect knowledge of the laws of health and of disease; subjects well elucidated by Mr. Travers, to whose work the author refers the surgeon, with the assurance that he will be much benefited, and aided in his judgment and in his practice by its perusal.

It cannot fail to strike the attention of the reader of the cases which have been brought before him, that most of them have been attended, during their first period, with *diffuse cellular inflammation*, which in most instances has gone on to suppuration, and in some to extensive sloughing of parts; still, however, the cases have, with few exceptions, done exceedingly well. But although this attendant is not uncommon on injuries done to the body, it is nevertheless a formidable one, and requires the promptest assistance.

"Diffuse cellular inflammation" is a disease well known, and very familiar to every medical practitioner. Dr. Duncan wrote ably on the subject under the above appellation; but Dr. Thomson and Mr. Copland Hutchinson designated it "phlegmonoid erysipelas." It is a disease with which the practical and operating surgeon cannot make himself too well acquainted; and as it is observed to be a very usual sequel of the accident which we are now treating, the author trusts that he may not be considered tedious in stating its general characters; for a more detailed account of which he begs, however, to refer to Dr. Craigie's highly valuable

work on "General and Pathological Anatomy." "Diffuse cellular inflammation" is a term used to indicate a spreading inflammation in cellular or reticular tissue, and employed in contradistinction to "phlegmon," in which disease the inflammation is circumscribed: and the difference between the two is not inaptly illustrated by Hunter, in comparing the effects of water on dry and moist paper. Although Hunter's explanation is, as Dr. Craigie observes, the statement of a physical, not a physiological phenomenon, it affords, nevertheless, no imperfect idea of the distinction between the limited and spreading nature of inflammation in the texture alluded to. On various occasions the author has spoken of the violence used to reduce the luxation, as a cause of phlegmonoid erysipelas; but he has likewise admitted, that it may result from the injury which the soft parts suffer, simultaneously, with the displacement of the astragalus.

It may terminate in mere serous infiltration, but it more usually ends in suppuration and sloughing, requiring free incisions and general supporting means, under which treatment the disease usually yields: but gangrene, to a great extent, will sometimes follow, and terminate fatally.

FINAL RESULTS.

The terminations of cases have been the following:—One in the formation of a new joint; two in false and true anchylosis; three in death; and which of these will happen, must depend, in a general way, on the nature and limits of the actions set up during the primary incidental period of the injury.

NEW JOINT.

Although the presence of a portion or fragment of the astragalus in the ankle may not prevent the formation of a new joint, (as the resources of nature under accidents occurring to the limbs are often displayed in the most wonderful manner,) yet the author cannot doubt, but that a better chance is given to the formation of a useful articulation when the joint is free for the fair descent of the tibia and fibula, than when this effect is prevented by the interposition of bony fragments. This fact is most satisfactorily illustrated in plate 3, which refers to a case occurring under the author's colleague, Mr. Wilson, who has favoured him with the following letter, giving an account of the same:—

"Dear Turner,—I was early, in the course of my practice, led to contemplate the very serious nature of the simple complete dislocation of the astragalus. The preparation I send you, and the history of the case, will best illustrate my own ideas upon the subject. In the year 1829 I received a letter from Mr. Rogerson, of Garstang, in this county, stating that a young man, who had two years before received an injury to his ankle, which had entirely deprived him of the use of his foot, was desirous to be admitted into the Manchester Infirmary, for the purpose of undergoing amputation of the limb, provided no other means could be devised in order to rectify the effects of the accident.

"James Lamb, aged 31 (the person referred to), was admitted the 31st day of May, 1829. The right foot presented a very singular appearance: it was turned considerably inwards, so that when placed upon a level surface the only part which came in contact with the ground was the extreme outer side of the foot; the two points of contact being the outer edges of the os calcis and metatarsal bone, supporting the little toe; the patient could not bear the slightest weight to rest upon the foot. Upon the outer side of the dorsum there was a large projection: the lines of the tibia and fibula could be regularly traced; and there was

no evidence to show that these bones had of themselves suffered injury. The integuments covering the projection were uninflamed at this time; but on the slightest exertion, redness with heat immediately ensued, and several times slight sores had formed upon the shin. Considering the length of time which had elapsed since the accident, it was not thought right to make any attempts at reduction, and at the patient's earnest solicitation, with the consent of my colleagues, I amputated the leg, and the patient had a good recovery."

Mr. Wilson has, in his letter, also favoured the author with the particulars of a case where he excised the bone with perfect success, leaving a moveable and useful joint; as well as an account of a case where he, assisted by the late Mr. Ransome, brought about reduction, which the author presumes to be the same case as that given by Mr Gaskell; and he thus concludes his letter, with his opinion as to the practice to be recommended in dislocations of the astragalus:—

"In complete simple dislocations (attempts at reduction failing) the practice, I imagine, reduces itself to these two points: first, whether it is right to make an incision through the soft parts and extract the astragalus, suffering the tibia and fibula to form a bed upon the os calcis, thus bringing the case (but it must be remembered under more favourable circumstances) to the condition of a compound case; or, secondly, whether we shall take the chance (if I may so term it) of the parts, under proper treatment, undergoing that change which does frequently happen; so that the bones shall adapt themselves to their new relations; for myself, I strongly incline to the first measure, namely, extraction of the irreducible bone, *now* become a very *formidable foreign body*. It is very true inflammation may, and often does ensue; sloughing take place, and nature rid herself in many instances of the offending body, but usually after a good deal of constitutional irritation; but I believe the effects of an incision, for the extrication of the astra-

galus, through parts uninflamed is not likely to be attended by so much constitutional irritation as the effects of the same end accomplished by nature's more tedious process of sloughing. Your own case, which I had an opportunity of witnessing, affords abundant evidence of this fact. I rejoice that you have brought this subject fairly before the profession, as it must lead to much interesting discussion, to a knowledge of facts, and to a right line of practice, which can only result from the experience of many.

"With much regard,

"Believe me, dear Turner,

"Your's truly,

"W. I. Wilson.

"*Mosley Street, February 6th*, 1843."

The opinions entertained, and here expressed by Mr. Wilson, are in accordance with the author's, as given in the preceding parts of this paper; and the author believes that he is justified in stating, that they coincide with those of all his colleagues at the Royal Infirmary. But to revert to the particular subject now under consideration, viz., the impediments to the formation of a new joint by the interposition of fragments of bone between the tibia fibula and calcaneum, so well illustrated in plate 3, copied from Mr. Wilson's preparation; the author begs to mention, that it seems also to confirm his views as to the locality of the tibia when the astragalus has been completely dislocated or completely excised; and which, conformably to his opinion, were printed, and plate No 1, illustrative of it, struck off, before Mr. Wilson's preparation was known to him.

If the author's views of what happens be correct, we ought to find, firstly, that when the astragalus is completely removed from between the tibia and fibula above, and the os calcis below, the two

George F Tenniswood del

Drawn by G.F. Tennswood.

Mr Turner's Paper.

Day & Haghe lith.rs to the Queen

former bones should be drawn towards the latter, as seen in plate 1; but, secondly, if the astragalus be partially displaced outwards and forwards, and fractured, and one or more of the fragments of the bone should remain interposed between the cup of the os naviculare and the anterior inferior edge of the tibia, that this bone would be still drawn downwards, or the foot upwards, but its articular surface would occupy the *posterior* astragalar facet of the os calcis, instead of the anterior; thus, the posterior edge of the tibia recedes, or is situated nearer the tuberosity of the heel than when the astragalus is wholly luxated or excised; and the heel in this case will be shortened instead of lengthened, as it appears to be when the hollow of the os calcis has been vacated by the astragalus, and gives occupancy to the tibia, which descends upon it.

If plate 3 be compared with plate 1, it will be noticed, that in the former instance, as in the latter, the malleolar process of the tibia is closely applied to the os calcis, but in the first case the bone is anchylosed with it. The apposition of the tibia to the os calcis is complete at the malleolus internus; but in the front view of the preparation, from which the engraving is taken, the position of the line of the under articulating surface is oblique from within outwards, the obliquity inclining outwards and upwards. This is caused by a portion of the fractured astragalus being interposed, and anchylosed to the tibia, fibula, and calcaneum. The fibula and outer edge of the under articulating surface of the tibia being thus mechanically prevented

from descending, it follows, as a matter of course, that the malleolar or inner part *alone* of the tibia or shin bone is brought into contact with the os calcis; that the partially dislocated and broken astragalus prevents the approximation of the outer part of the tibia and fibula to that bone; that the line of articulation between the leg and the foot, thus becoming oblique, the prominence of the inner malleolus is lessened, whilst that of the outer is increased; and the obliquity of the line of articulation being from within upwards and outwards, the shafts of the tibia and fibula are thrown in an oblique direction upwards and inwards, and the foot becomes strikingly inverted; most of which facts are shown in plate 3. This case is an instructive one in other points of view: it shows either that a disarticulated bone, *if fractured,* will pour out osseous juice so abundantly and extensively as to anchylose it, not only to the bones with which it is in contact, but to cement in one mass all the bones of the joint, namely, the tibia, fibula, astragalus, os calcis, and navicular bone; or, that the presence of a bone, not in its proper locality, acts by producing irritation and inflammation, which may set up disease in the joint, and be followed by abrasion of cartilage, by secretion from the surfaces of denuded bone, and anchylosis; whence the hazard of a portion of bone being allowed to remain, unless it preserves some of its articular facets undisturbed, as in Mr. Sawyer's and other cases?

When the displaced bone is allowed to remain in its new situation, there is, *cæteris paribus,* no more

impediment to the formation of a new joint than when the astragalus has been excised; but in the former case there may be some risk of a mechanical hindrance to the motions of the foot, whereas in the latter it is quite sure that this cause cannot operate.

What really happens, then, when the astragalus has been wholly removed?

Boyer says, that after the astragalus is extracted the tibia is approximated to the os calcis, and the soft parts around the articulation become relaxed. The enormous void which results from the extraction quickly diminishes, and the articular surfaces of the tibia, the fibula, and the calcaneum, become anchylosed; thus, he says, the movements of the foot are abolished, and the member loses a part of its length, equal to the height of the astragalus.

M. Boyer came to this conclusion, no doubt, from having had an opportunity of dissecting the limb of a patient of Desault, on whom extraction had been performed, and where he found the tibia almost entirely anchylosed with the calcaneum; but it does not follow that anchylosis is an inevitable consequence, and that the cure always takes place after this manner.

Richerand says, that the bones of the leg become permanently fixed by bone to the heel bone. Although the termination of the case may be in false or true anchylosis, yet in the majority of cases in which extraction has been performed these results did not follow. Mr. Smith, in a letter to the author with respect to the mode of termination of Bracewell's and Faucett's cases, writes, that each patient "had an excellent hinge joint of the tibia on the

os calcis," and numerous instances offering a similar result have been recorded: thus, in Mr. Phillip's first case, an artificial but moveable articulation seems to have been formed between the bones of the leg and the os calcis; and in the second case, an articulation, enjoying considerable extent of motion, was produced after the same manner.

We have opportunities in practice of seeing how the head of the bone, in an unreduced dislocation, will, by pressure on the surface of the bone on which it happens to rest, form for itself a new articulating surface, and in time acquire a considerable degree of motion. Sir A. Cooper has given, in his work on "Dislocations," two plates illustrative of this fact in unreduced dislocations of the hip; and the author has, in the Museum of the School of Medicine in this town, a preparation showing the same thing in dislocation of the shoulder joint. In these cases the socket is lined by a cartilagiform texture, (no doubt arising from a change effected by the pressure which the head of the bone exerts on the periosteum,) and, probably, a membrane composed of cellular texture, which performs the office of secreting a fluid, which, if not identical is equivalent in purpose to true synovia. The juxtaposition of surfaces in irreducible dislocation of the hip forwards or backwards, or in the shoulder forwards or backwards, does not form so intimate a co-aptation as that which exists in the ankle when the astragalus is removed; for here, the anterior edge of the tibia is received in the cup of the navicular bone, and the under cartilaginous surface of the tibia is brought into contact with tolerably

accurate apposition with the os calcis; thus, a good and favourable adaptation of parts exists for the formation of a new joint. The pressure of the anterior edge of the tibia will readily cause a transition of its periosteum into cartilage or cartilagiform structure, and will enable it to move easily on the cup of the navicular bone; and the pressure of the inferior articulating surface of the tibia will readily, we imagine, wear down or cause an absorption of the asperities between the anterior and posterior articulating facets of the os calcis, so as to form a surface on which the polished cartilage of the tibia will glide easily backwards and forwards in extension and flexion. In all these cases there is, for a long time, a stiffness or false anchylosis, induced by the indurated textures which connect the bones, and by the rigidity of tendons, from inaction and long immobility of muscles; but by degrees these difficulties are in a great measure overcome, and the joint enjoys a fair extent of movement; which, at all events, has been the result in many cases where extirpation of the astragalus has been performed.

In the last case detailed by the author, there rests on his mind no doubt but that the joint is formed between the tibia, os calcis, and os naviculare: the length of the heel being apparently increased, and the leg, from the knee to the sole of the foot, being shortened the depth of the astragalus, appear to him to be conclusive on this point; and the certainty of it is borne out by what has happened in other cases.

The form of the foot (see plate 2) denotes, on

comparison, that the inner malleolus on the left is about one inch lower than that on the right side; that the expanse across the instep is less in the left than it is in the right foot; and that the left os calcis is raised an inch above the level of the right.

The admeasurements in the 45th case are:—

RIGHT LEG:

From inside of patella to ball of great toe	1 foot 8 inches.
From point of heel to ball of great toe	$7\frac{1}{4}$ inches.
From inside of patella to point of heel	1 foot $7\frac{1}{2}$ inches.

LEFT LEG (THE INJURED ONE):

From inside of patella to ball of great toe	1 foot 8 inches.
From point of heel to ball of great toe	$7\frac{1}{4}$ inches.
From inside of patella to point of heel	1 foot $6\frac{1}{2}$ inches.

The issue of the case may, in some measure, be calculated upon by the sequel of the operation; if the inflammation be not considerable, and the suppurative process slight, we may augur favourably as to the degree of motion which the part will have when the cure is complete, because, in all probability, the cartilages will resist the ulcerative process, as we know they often will do, in the midst of extreme suppuration; but if the limb should suffer from phlegmono-erysipelatous inflammation, followed by extensive abscesses and sloughing, the cartilages are hardly likely to escape the havoc; and then a bony union of parts, and therefore a more tedious and protracted cure, may be the consequence.

G F Tenniswood del.t

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Alfred Adland sc.

ANCHYLOSIS.

Another mode of termination of the removal of the astragalus from its natural situation is in anchylosis. Monsieur Boyer is of opinion that this result (which, taken in its fullest acceptation, is the soddering of bone to bone by a deposit of new osseous cement) is *inevitable* in cases where the astragalus has been extracted, and occurs after the same manner that it takes place on section of the tibia, in compound dislocation of the ankle joint. It is, perhaps, presuming too much to differ from such a surgical authority; but the author thinks that the state of matters in the two cases is very dissimilar, so far as provisional circumstances for such an event are concerned: since, on the removal of the astragalus, where there is no solution of continuity in the tibia, fibula, and os calcis, and no fragment of the astragalus left in the joint, there is no injured bony surface to take on ossific action. The author admits that this preliminary is not invariable or essential, but it is a presumed antecedent in the majority of cases; and in the absence of it, we may reasonably and fairly anticipate that true anchylosis will not happen. The case may end in false anchylosis, a state of matters arising from thickening of ligaments, rigidity of tendons, and other textures; but the sodering of bones, naturally distinct from each other, usually implies the pre-existence of caries, or fracture: for in these cases we shall have an injured surface, in which increased action of a reparative kind will be set up, callus secreted, and the bones will, by means of osseous effusion, become cemented, a

provision for which event is made on an extensive scale in cases of section of the tibia in dislocation of the ankle. Monsieur Boyer admits a distinction between false and true anchylosis, in attributing the former to the condition of the surrounding and connecting textures of the joint; and he admits, at the same time, that *true* anchylosis results sometimes from white swellings, wounds of joints, hydrops articuli, and from other diseases in which the articular cartilages are destroyed, and the bones brought into a carious condition, which state of matters the author believes to be almost if not essentially necessary. In those cases, if nature should come to the aid of art to arrest the progress of caries, morbid may be exchanged for healthy action; granulations will arise from the denuded articulating surfaces, the granulations of one surface will become united with those of the opposite, and by the deposit of phosphate of lime in them, they will constitute a medium for cementing the bones together, and thus producing *true* anchylosis.

There is reason to believe that false anchylosis does happen for a time, as the sequel of the removal of the astragalus, owing to the long immobility of the limb, the chronic action in the ligaments and adjoining textures, and rigidity of tendon and muscles from long disuse. But this disease is curable; whereas true anchylosis, which may be apprehended when extensive suppuration in the joint has followed the operation, is permanent or incurable, as nothing can unsoder the bones thus united by osseous matter, and nothing can give motion to a joint thus rendered immoveable.

Finally, *death* has been the result of the accident in four cases, and in all from the destructive effects of diffuse cellular suppuration and sloughing. It is remarkable, indeed, that more cases have not terminated fatally; and when we consider the locality and violence of the injury, it is very extraordinary that in no one instance has *tetanus* occurred as a result of dislocation of the astragalus.

CONCLUSION.

The author fears that the length of his paper may bear the stamp of tediousness, and will amount to an unreasonable monopoly of the pages of this volume of the Society's *Transactions*; if so, he can but apologize, and hope for an excuse, on the ground of having wished to do justice to the numerous communications of his professional brethren, who have so kindly and liberally assisted him in the execution of his labours. When the author considers the prompt manner in which the applications to his professional friends have been responded to, he is fearful that it will appear invidious, in acknowledging and recording their acts of kindness, to make any distinction; but he feels assured that he will be readily excused for returning, in an especial manner, his thanks to Mr. Smith, of the Leeds Infirmary, when he states, that this gentleman has had his attention directed a good deal to dislocation of the astragalus, from the circumstance of his experience in this accident having been singularly great; and that it was his intention, had he not been anticipated by the author of this paper, to have prepared a short essay on the subject, which

project he kindly chose to abandon in the author's favour, and liberally handed over to him his cases, clinical observations, and his casts, to use as he thought proper. The author has spared no time or labour, compatible with the discharge of his public and private professional duties, in endeavouring to amass facts whereon to build the principles to be borne in mind, and to elucidate the practice to be adopted in dislocations of the astragalus: he would, therefore, fain indulge a hope, that his attempt, seconded as it has been by his professional friends, to inspire confidence in hospital and private surgeons, at a period of extreme emergency, will be acceptable to them; and although he is aware that the execution of his paper has not been commensurate to the advantages which he has derived from the valuable communications of his surgical brethren, yet he trusts that he may have contributed some assistance towards the rendering of his and their services more decided, and more efficient, in the relief of suffering humanity.

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Young, Edward William, Esq., Surgeon, Henley-upon-Thames.
Young, James, Esq., Surgeon, Wells, Norfolk.

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Appleton, J. G., Esq., Surgeon, Hitchin, Herts, and *not* of "New Zealand," as printed in page 525.
Brackenbury, Ralph, Esq., Surgeon, 9, Brown Street, Manchester, and *not* as printed in page 529.
Burman, Smith, Esq., Surgeon, Wisbeach, and *not* "Smith, Burman," as printed in the Council, page 517.
Green, W., Esq., Surgeon, Ixworth, Suffolk, (page 539,) should have been omitted, as he is *not* now a member of the Association.
Ley, Richard, Esq., Surgeon, North-Molton, Devon.
May, G. P., M.D., Malden, Essex.
Rust, Henry, Esq., Surgeon, Saling, Essex.
Ryott, William, Hall, M.D., Thirsk, Yorkshire.

As it is scarcely possible to avoid errors in printing so numerous a list of Members, the Secretaries are anxious, wherever they are committed, that they may be amended; and will therefore feel obliged if those Members whose names are not rightly inserted, or whose Christian names are omitted, will send a notification to them, free of postage.

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THE FOLLOWING ARE

THE PRINCIPAL OBJECTS

TO WHICH THE ATTENTION OF THE

PROVINCIAL

MEDICAL AND SURGICAL ASSOCIATION

IS DIRECTED.

1st.—Collection of useful information, whether speculative or practical, through Original Essays, or Reports of Provincial Hospitals, Infirmaries, or Dispensaries, or of private practice.

2nd.—Increase of knowledge of the medical topography of England, through statistical, meteorological, geological, and botanical inquiries.

3rd.—Investigations of the modifications of endemic and epidemic diseases, in different situations, and at various periods, so as to trace, so far as the present imperfect state of the art will permit, their connexions with peculiarities of soil or climate, or with the localities, habits, and occupations of the people.

4th.—Advancement of medico-legal science, through succinct Reports of whatever cases may occur in Provincial Courts of Judicature.

5th.—Maintenance of the honour and respectability of the profession, generally, in the provinces, by promoting friendly intercourse and free communication of its Members; and by establishing among them the harmony and good feeling which ought ever to characterise a liberal profession.

THE LAWS

OF THE

PROVINCIAL

MEDICAL AND SURGICAL ASSOCIATION.

1st.—THAT a Provincial Medical and Surgical Association be formed.

2nd.—That the Association be managed by a President, two Secretaries, and a Council.

3rd.—That the several Officers be appointed annually, by a General Meeting of Members convened for that purpose, at whichever of the principal towns may be appointed; the place of such Meeting being prospectively notified each year.

4th.—That at this Meeting shall be presented a Report, prepared by the Secretaries, of the general state of the Association, its proceedings, and pecuniary accounts; the Report to be afterwards printed, and a copy supplied to every Member.

5th.—That at this Meeting one of the Members shall be appointed to give, at the next Annual Meeting, an account of the state or progress of Medical Science during the last year, or an Oration on some subject connected with Medical Science, or a Biographical Memoir of some eminent cultivator of Medical Science, who may have resided in the Provinces.

PRESIDENT.

6th.—That the office of President be honorary, and conferred on some senior Physician or Surgeon of eminence, resident in any of the provincial towns comprised in the circle of the Association.

SECRETARIES.

7th.—That the two Secretaries be resident in Worcester, the place of publication, their duties being to attend to the printing of the *Transactions*, and to correct the press; to be present at the meetings of the Council, and to keep the minutes thereof; to correspond with the Members of the Association; to receive and submit to the Council all papers transmitted for publication; and to keep the financial accounts of the Association.

COUNCIL.

8th.—That the Council consist of —— Members, to be selected from the principal provincial towns. The Council, with whom must rest the chief responsibility of publication, to have full power of deciding on all papers transmitted, and the consent of three of its Members must be obtained before any paper can be published. It shall also be the duty of the Council to receive the subscriptions, when due, in their respective districts.

9th.—Every Member shall receive weekly a copy of the *Provincial Medical and Surgical Journal.*

REGULATIONS OF THE DISTRICT BRANCHES.

10th.—That Members of the Association be at liberty to form District Branches wherever it may suit their convenience.

11th.—That in order to facilitate the formation of such Branches, and maintain uniformity amongst them, the General Council provide suitable instructions for the guidance of those who may unite in instituting them.

12th.—That conformity with these instructions be further ensured, by the initiating proceedings and organization of each Branch being submitted to the General Council, for their revision and approval.

13th.—That the District Branches be free to govern themselves as their respective Members may think fit; but that the by-laws ordaining the special government be submitted to the General Council previously to their taking effect, in order to guard against the possibility of any such by-laws contravening the fundamental laws of the Association.

14th.—That all Members appointed to offices by the District Branches be enrolled as Members of the General Council, on the appointments being officially notified to the General Council, it being highly expedient that all who engage in the executive management of the District Branches should be also Members of the General Council.

15th.—That the expenses incurred by the District Secretaries in conducting the proceedings of the District Branches be defrayed from the general fund, provided such expenses do not, in any instance, exceed one-seventh part of the guinea subscribed by each Member enrolled in the District Branch.

16th.—That if any circumstance arise in the formation of District Branches which calls for a larger expenditure than what is allowed by the foregoing resolution, such expenses, provided they do not exceed one-fourth of the guinea, may be allowed, by a statement of the circumstances being made known to the General Council.

ELECTION OF MEMBERS, ANNUAL MEETINGS, &c.

17th.—That each Member, on applying for admission, be nominated by two Members, as a pledge of eligibility.

18th.—That at each Annual Meeting the place of meeting for the ensuing year shall be announced.

19th.—That any Member wishing to propose a new law, or an alteration in an existing law, must send notice of his intention to one of the Secretaries three months previous to the Anniversary Meeting, which will be circulated with the Report of the Council.

20th.—That the Association appoint Honorary Members at the Anniversary Meetings only.

21st.—That the Association appoint Members in foreign countries to be styled "Honorary Corresponding Members," from whom communications, respecting the state of medicine in those countries, is expected to be received.

BENEVOLENT FUND.

22nd.—That a Medical Benevolent Society, under the restrictions proposed in the Report of the Committee presented to the Anniversary Meeting at Oxford, be connected with the Association.

PAYMENT OF SUBSCRIPTIONS, &c.

23rd.—Each Member of the Association to pay one guinea admission, and the same amount annually afterwards; the subscription to commence from the 1st of January each year, and to be considered as due, unless notice of its being withdrawn be given to one of the Secretaries antecedently to the year for which it would be payable; for such subscription each Member shall receive a copy of each part of the *Transactions* published. Each volume to contain a list of all the Members.

24th.—That those Members who have not an opportunity of paying their subscriptions to a Member of the Council resident in their district, are requested to pay it through the medium of their own Bankers, to Messrs. Robarts and Co., London, for Messrs. Berwick and Co., Worcester, on account of the "Provincial Medical and Surgical Association."

25th.—That all Papers, and other Communications, be addressed to the Secretaries, Dr. Hastings or Mr. Sheppard, Worcester, and forwarded carriage free.

26th.—That Messrs. Berwick & Co., Old Bank, Worcester, be the Treasurers of the Association.

RULES

OF THE

BENEVOLENT FUND

OF THE

PROVINCIAL

MEDICAL AND SURGICAL ASSOCIATION.

Before specifying the Rules which are to direct the proceedings of this Society, it is proper to repeat, in this place, the main principles on which it is established. It is not intended either to be a Benefit Society, or an Assurance Club; but, strictly speaking, a benevolent or charitable institution, founded and promoted for the express purpose of assisting our professional brethren, when struggling under the pressure of disease or other calamities. It is likewise proposed, under circumstances of peculiar urgency and distress, to administer relief to the widow or family of a professional man, who may have been deprived of the support and protection of a husband or parent. While, therefore, the sole design of this society is to hold out the hand of charity and benevolence to a suffering and afflicted brother, or his family, it will not countenance improvidence or idleness, or evil habits of any kind.

The principle above stated has received the sanction of three successive meetings of the Provincial Medical and Surgical Association; and the following Resolutions were finally adopted at the anniversary, held at Manchester on the 20th and 21st of July, 1836:—

1. That a charitable fund be created by donations and subscriptions of members of the Association, to be called "The Benevolent Fund of the Provincial Medical and Surgical Association."

2. That contributions be received from all persons friendly to the objects of the Society, though belonging neither to the Association, nor to the profession.

3. That the object of the fund be the relief of medical men* under severe and urgent distress, occasioned by sickness, accident, or any other calamity.

4. That any medical man labouring under such afflictions, be considered a fit object for the charity.

5. That the claims of contributors shall, as far as possible, have the preference; but that contributions to the fund give no claim of right to relief, the fund being one of pure charity, and that each case be judged according to the urgency of the distress.

6. That under circumstances of pecular emergency, relief may be extended to the widows and orphans of medical men, it being understood that it is not the design of this fund to relieve medical men from the necessity of providing for their families by ordinary life insurances, and such other means as prudence dictates.

7. That the management of the fund be conducted by Committees of the contributing members, annually appointed; the Central Committee to be at Cheltenham, and Local Committees, subordinate to the Central, in each of the principal cities and towns—the Central Committee having power to appoint Local Committees, wherever they may be required.

All communications to the Central Committee to be addressed to the treasurer and secretary, Dr. Conolly, Castleton House, near Cheltenham.

* The Society will not acknowledge any one as a fit object of relief who has not received a regular professional education, and is either a Doctor of Physic, or a Member of the College of Surgeons, or of the Apothecaries' Company.

NOTICES.

All Papers, and other Communications, to be addressed to the Secretaries, Dr. Hastings or J. P. Sheppard, Esq., Worcester, and forwarded carriage free.

Those Members who have not an opportunity of paying their Subscription, which becomes due on the first of January in each year, to a Member of the Council resident in their district, are requested to pay it through the medium of their own Bankers, to Messrs. Robarts and Co. London, for Messrs. Berwick and Co., Worcester, on account of the "Provincial Medical and Surgical Association;" or they may remit the amount through the Post-office to either of the Secretaries.

Gentlemen wishing to join the Association, are respectfully requested to apply to some Member of the Council in their immediate district; or to Dr. Hastings, or J. P. Sheppard, Esq. the Secretaries, Worcester.

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